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**Digital foundations:  
A study of perceptions and practices surrounding the use of ICT in  
ECE Centres**

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## ABSTRACT

The use of information and communication technologies (ICT) in early childhood education (ECE) is controversial. Currently, ICT in ECE is experiencing a second wave of popularity. While many of the recurring debates exist around the use of technology in the education sector it would appear that ICT is here to stay. A distinguishing feature of the literature across both waves is a growing appreciation of the importance of pedagogy and the key role of the teacher.

This thesis builds on this broad concept of pedagogy by investigating the growth of ICT in ECE. The aim of the study was to discover new insight and understanding of how parents', teachers' and children's perceptions of the use of ICT in ECE influence the surrounding practice. A mixed-method approach was undertaken with a sample group in three distinct phases in one geographical location in the greater Wellington region. The study adopted an interpretive framework to inform the research methodology and help explain the findings.

The findings across the three phases show the multifaceted nature of ICT and the many layers that are required to ensure that it can be offered in an authentic and meaningful way in ECE. When this approach is not evident it constrains the integrated use of ICT and affects the quality of the programme offered. Factors that influence the level of quality include: (a) the role of teacher's beliefs and self-efficacy; (b) fluid conceptions of pedagogy; (c) the competing and co-existing drivers associated with the use of ICT in ECE; (d) the changing face of literacy; (e) barriers affecting the full integration; and (f) the implications of policy on practice.

The thesis draws on the framework of an enabled and enacted ICT curriculum developed in the literature review, as a tool to indicate and understand the current state of the level of ICT integration in ECE centres. Overall the findings show that participating teachers have begun their ICT journey and are working towards the goal of offering an authentic and meaningful educational experience. Yet, the research shows that the many layers of support necessary to ensure teachers continue to move forward on this journey are not well understood. A failure to address these gaps may sadly lead to a "third wave" of ICT in which history repeats itself.

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## CHAPTER ONE

### Introduction to the study

Those interested in using computers in early childhood education stand at the crossroads. Will we use computers merely to help reinforce existing educational practices or to catalyse educational innovation, ... Decisions made in this will have a significant impact on young children's learning and development. (Clements, Nastasi, & Swaminathan, 1993, p. 56)

Teachers stand at the crossroads. Once again the early childhood education (ECE) sector has a crucial decision to make. The choice is similar to that identified by Clements, Nastasi and Swaminathan (1993) faced almost two decades ago between reinforcing existing practice or embracing the innovative use of information and communication technologies (ICT) to enhance the educational experience. There is a strong sense of *déjà vu* in comparing the problems and issues confronting the sector 20 years ago with those arising from recent ICT policy initiatives (Ministry of Education, 2005). Indeed, with the benefit of history it is timely to question how current developments in ICT are progressing and whether the lessons from the past will be learnt. Accordingly, this study examines different stakeholder perceptions and practices surrounding the use of ICT in ECE. It sets out to establish the extent to which the current policy rhetoric concerning the potential of ICT to transform practice is being realised, directly or indirectly, in ECE learning programmes.

There has previously been substantial debate regarding the role that ICT plays in ECE and whether or not it is an appropriate medium for young children's learning. One school of research suggests that computers are an important means through which children can explore concepts which otherwise would be very challenging to understand. Proponents of this view emphasise that it is important for teachers to develop an awareness of how technology can be used appropriately (Clements, 1999).

In stark contrast, another school of thought questions the role of ICT and the use of it by young children. Questions associated with relationships between ICT, the context in which they are used, the perceptions of those involved and how these forms of

technologies are used to support learning are, therefore, of increasing importance for teachers, research (Edwards, 2005a) and policy makers. This study is cognisant of both perspectives and critiques the ongoing debate about the benefits of ICT in ECE. It adopts a critical stance on the drivers behind ICT and reports the findings of a study of what is actually occurring in practice.

### ***Early childhood education in New Zealand***

This section situates the use of ICT in the New Zealand context. Although issues concerning ICT in ECE are relevant to many international contexts, it is important to situate this research in the local context. Accordingly, this section backgrounds how New Zealand relates to the international context in terms of ICT in ECE.

Early childhood education in New Zealand has evolved in response to the shifts within the sector, changing needs of society, changing policies, national and international research, and other imperatives for the education of young children (May, 2001, 2002). These include, but are not limited to, the establishment of teacher qualifications, licensing requirements, quality ratios and structural versus process quality issues. Over time, evaluative studies and research have continued to inform professional practice. A diversity of early childhood services have been established to meet the needs of a changing society. Hedges (2007) writes that since the 19<sup>th</sup> century these services have evolved in a somewhat arbitrary and fragmented way and over the past 40 years a focus on education has occurred. A special characteristic of the early childhood sector in New Zealand is that it is non-compulsory and, therefore, the relationship that the government has had traditionally with the sector is one that provides a regulatory and funding role, rather than an ownership role.

Consequently, a diversity of services have evolved which have been strongly influenced by a feminist perspective and society change (May, 1997, 2001). This diversity of services includes formal and informal early childhood education services which are both community based and private enterprise. Licensed early childhood education services comprise (a) sessional-based education at both state and private kindergartens for three and four year olds, (b) home-based services,

(c) correspondence early childhood education for children in remote areas or those who are hospitalised or in families which have serious illness, (d) parent-facilitated Playcentres, (e) sessional community crèche, (f) full-time childcare centres for children from birth to five years of age, (g) specialist programmes such as Montessori and Rudolf Steiner and (h) language and cultural-based learning environments for Māori and Pasifika children (May, 2002). There is also a diverse range of Ministry of Education partially funded, but unlicensed, playgroups in operation throughout the country.

Much of the literature sourced for this study is internationally based; therefore, it is necessary to make a distinction between New Zealand early childhood models and those of overseas. Internationally the terms commonly used to define the early childhood field do so in “relation to the next step in the education system, that is: pre-school, preparatory and pre-elementary” (Bertram & Pascal, 2002, p. 5). Often separate bodies in many countries govern the care and education of children. A significant difference between international models of early childhood and the New Zealand model is the integration of education and care in New Zealand. In 1986, the administration of ECE and care services was integrated within one New Zealand government department, the Ministry of Education. Internationally, structural and administrative divisions have further exaggerated the separation between education and care (Bertram & Pascal, 2002).

There is also variation across countries in the ages of children considered to be enrolled in ECE. In New Zealand, for example, this would include children from birth up to age five years old, the common age at which children begin primary school. In the United States children start kindergarten at the age of five, but may have attended nursery school or been in full childcare prior to entering kindergarten. Elementary school starts at age six. In England and Scotland, children attending Nursery schools are between three and five years of age. Reception classes are also available to children who have not yet reached the compulsory starting age (five years old). In 2002, the foundation stage was introduced as part of the National Curriculum (Qualifications and Curriculum Authority, 2008), which led a more structured and prescriptive approach to teaching (National Literacy Trust, 2009). In contrast, Sweden

operates public daycare facilities for children from one to age five and at age five children often attend a non-compulsory preschool. These differences are important to consider when interpreting the literature.

### ***My personal history***

In any study the researcher brings their own set of values and beliefs that shape their view of what is occurring (Kagan, 1992). This means that the researcher is incapable of neutrality (Rubin & Rubin, 1995). Therefore, it is important that I discuss my personal history with regards to ICT in ECE and make explicit my biases in shaping this study.

I began my teaching career in 1995 and within a short span of time was faced with the dilemma of having a computer in the playroom. These computers often arrived in the centres with great enthusiasm from parents / caregivers and were quickly believed to be an important learning opportunity for children. In reality, these computers were often slow and frustrating for the user and an inconvenience for the teachers (Oldridge, 2007). Because of these issues, I chose to leave the computer area to teachers with a greater level of knowledge or I would cover the computer up and not offer it as a learning experience at all; in other words, “out of sight out of mind”.

However, by 2001 I had become an active user of ICT and had become enthusiastic about its many applications. I then joined The New Zealand Correspondence School to work on a two-year pilot programme, which incorporated an action research project that focused on using ICT initiatives to foster a ‘community of learning’ (Wenger, 1998). A short time after the completion of this project I was seconded to the Ministry of Education to assist with the development of the ICT framework, *Foundations for Discovery* (Ministry of Education, 2005). Over this time my knowledge and enthusiasm of ICT continued to grow alongside a greater appreciation of the pedagogical issues surrounding ICT. However, it was not until I enrolled in the doctoral programme and began working on this thesis and examining the related literature and policies in greater depth that I began to truly understand the rhetoric and

reality surrounding ICT use and the rationales that drive it. It would seem that Papert (1993) is right when he states that sometimes real learning just takes time:

The simple moral is that learning explodes when you stay with it: a full year had passed before the effect in my mind reached a critical level for an exponential explosion of growth. (p. 103)

### ***Research aims and context***

This thesis investigates the use of ICT in ECE. For the purpose of the thesis the term ICT is defined as “items of equipment (hardware) and computer programmes (software) that allows us to access, retrieve, store, organise, manipulate, share and present information electronically” (Ministry of Education, 2005, p. 4). Looking specifically at the New Zealand ECE sector, the term ICT could include computers, computer software, digital cameras, video camera, faxes, speakerphones, the Internet, dictaphones and many other electronic devices. Thus, a relatively inclusive definition is adopted for the purpose of this research.

The research aim is to investigate the perceptions and practices surrounding the use of ICT in ECE settings. Specifically, it seeks to investigate the use of ICT in ECE in one geographical area in the Wellington region. The sample will be further refined to two case studies in the same geographical location, which explore the nature of the learning experiences young children have in the home and ECE setting along with children’s, parents’/caregivers’ and teachers’ perceptions of ICT. The study adopts an interpretive framework to inform the research methodology and help explain the findings.

A major strength of the research is that a range of perspectives are sought from stakeholders as each have a role to play in influencing the use of ICT in ECE. Importantly, a major emphasis is placed on capturing the teachers’ voices, as they play a key role of gatekeepers of the technology, choosing if, and when, to offer the use of ICT to young children. Insights of parents/caregivers are also investigated, as working in partnership with parents/caregivers is a regulatory requirement and widely

held philosophical position in ECE within New Zealand. One form of partnership involves parents in shared decision making (Carr, 2001). Therefore, the study attempts to gather parents'/caregivers' opinions and perceptions of the potential benefits afforded to their children through the use of ICT.

Children have their own perspective to offer in matters that concern their lives (United Nations, 1992) and therefore their views are also sought. The participation of children in this research will assist with the triangulation of the research findings, provide an avenue for children's voices to be heard, enable multiple perspectives to be obtained and provide a rich picture of the perceptions and practices surrounding the use of ICT in ECE settings.

### *Overview of the thesis*

The thesis contains eight chapters. This first chapter establishes the foundations upon which this study is grounded by providing theoretical, methodological and personal factors that justify my interest in exploring this phenomena.

A diverse range of national and international literature informs this study and is presented in Chapter Two. In this chapter limitations of current theory and research are identified and have been used to guide the research questions and design of the present study.

In Chapter Three, the research design and theoretical framework, methods of data collection and the approach to analysis used in this study are discussed. Methodological issues, including ethical considerations and the importance of validity and reliability in relation to the present study, are addressed.

Chapter Four presents the findings in relation to the level and type of use of ICT in ECE services in a specific geographical location. Chapters Five and Six present the case study findings in relation to teachers', parents'/caregivers' and children's perceptions and practice concerning ICT use in ECE centres.

Chapter Seven provides a synthesis of the findings. It identifies the main themes that have emerged through the research and discusses these in relation to the literature. It illuminates the competing and coexisting rationales that stakeholders hold and the influence this has on pedagogy, partnership and curriculum.

Finally, in Chapter Eight, conclusions are drawn. The chapter reflects on implications for professional learning with regards to ICT pedagogy, parental partnerships and for policy development. In addition, the research questions are returned to in summarising the findings of this study. The chapter concludes by identifying a number of implications for future research.

## CHAPTER TWO

### Review of the literature

The use of information and communication technologies (ICT) in New Zealand early childhood education (ECE) settings is experiencing its second wave of popularity, and current evidence indicates that this is likely to continue. This chapter reviews theoretical and research-based literature about ICT in ECE. The review first considers the changing status of ICT in this setting and then examines the various theories of learning relating to young children and their relevance for the use of digital technologies in the education of young children today. The review then turns to *Te Whāriki* (Ministry of Education, 1996a), the central document underpinning ECE in New Zealand. Its potential alignment with the New Zealand ECE ICT framework, *Foundations for Discovery* (Ministry of Education, 2005) will be explored. It is also timely to consider the views of the various ECE stakeholders regarding their use of ICT. In particular, this review considers what an ICT enabled curriculum might look like. The review concludes by identifying emergent themes and introduces a number of research questions for further investigation.

### Search strategies

Before reporting on the literature it is important to describe how the review was conducted and the specific search strategies employed in the process of searching and interrogating the research. The literature search focused on the evolution from educational computing to ICT in the education sector over the past three decades and the factors that contribute to a mature and more sophisticated form of pedagogy of ICT in ECE. These key factors identified included teachers' values, beliefs, and attitudes, theories of learning, stakeholder perspectives, and policy drivers. Key words relating to these terms and concepts were searched accordingly.

A wide range of information sources was reviewed for this thesis. The following list illustrates the range of materials consulted:

- articles from professional journals

- books
- library databases including Infotrac, Eric, Web of Science and Epsco
- government policy documents
- conference proceedings
- case studies
- small scale research papers
- longitudinal studies
- sources on the World Wide Web (WWW).

Web searches were also conducted using Google and Google Scholar as the nominated search engines. When searching the World Wide Web, key terms were adjusted according to the yield of appropriate information. Terms used included the following: ICT and early childhood practice, teachers' beliefs, parents' and teachers' perceptions, young children and ICT, and effective pedagogy. EndNote was used for managing the bibliographic references, with more than three hundred sources contributing to the Endnote library.

Finally, the literature reviewed generally related to the area of ECE but where no relevant literature was located, the scope of the search was widened to include literature from the elsewhere in the education sector.

### ***The first wave of ICT in ECE***

The proliferation of new technologies has influenced people's daily lives and has impacted greatly on society. This includes having an impact on societal expectations regarding what is an appropriate curriculum in the educational sector. When studying the appropriate use of technology in education, it is useful to consider 'what it is' that children need to learn in order to become active and contributing members of society? In the 1980s ECE experienced the first wave of the use of ICT where the view was "that children must become comfortable with the tools and processes that impact on their lives" (Barnes & Hill, 1983, p. 250). However, this societal or futures rationale

was not without controversy. There were many publications in the 1980s about the positive and negative implications of educational computing, and debates continued throughout this period concerning the use of computers by young children.

In this first wave of ICT, a term not yet established in the educational lexicon, heated debates occurred over the role of computer assisted learning in ECE. These vigorous debates raised a number of criticisms about the use of computers, namely, that they did not encourage children to work collaboratively and could lead to social isolation; they were not developmentally appropriate; and would hamper social, emotional and physical development (Brady & Hill, 1984).

It is important to point out that criticisms of the role of computer assisted learning had limitations. Brady and Hill (1984) explain that empirical research that was referred to often had very small samples with limited research controls being employed. Research also made generalisations “beyond the data collected” (Brady & Hill, 1984, p. 51). In addition to these limitations in the reasoning and evidence used to justify criticisms of computer assisted learning, a growing body of empirical research was beginning to refute these criticisms.

A further debate existed around the social isolation of children and the displacement of other important learning experiences. These concerns were also shown to be unfounded by Lipinski, Nida, Shade and Watson (1986) as they found that social interactions at the computer were similar to the interactions that occurred in other areas of the classroom. Findings also show that while some initial disruption was evident when a computer was introduced to the classroom in free play patterns, over time this returned to baseline levels. A replication study was undertaken by Lipinski et al., (1986) which aimed to investigate the effects of microcomputers on young children by examining the results of children’s free play choices and social interactions. This study was conducted with two groups of children: one in full-day care and one in part-time care. The results showed that although initially the computer was seen as a novelty and did interrupt the free-play pattern, within two

weeks play areas returned to normal baseline levels. The study also found that there was a great deal of verbal, cooperative and supportive interaction occurring when children were given access to a microcomputer.

One of the strongest objections to inappropriate computer use drew on developmental theory. It was claimed, based on Piaget's (1953) developmental theory, that young children should not be introduced to computers because in order to use computer technology successfully children must first reach the concrete operational stage (age 7-11 years) (Shade & Watson, 1990). Piaget advocated that when children reach this concrete operational stage, they are then able to think through a task in their heads, rather than having to physically carry it out. Because of this they are able to use symbols to carry out these cognitive tasks, to think logically and to consider multiple perspectives of a situation. Consequently, children in ECE settings, according to Piaget's developmental theory, were not able to cope with the level of cognitive processing required when using computers.

In contrast, however, Papert (1980b) believes that the influence of the materials a culture provides is paramount in determining the order of development of these intellectual abilities. For example, if the culture is rich in computers, children would have the opportunity to develop the ability to use symbols to carry out cognitive tasks, to think logically and to consider multiple perspectives of a situation. In this regard, debates over the use of computers by young children were part of a much wider debate over how and when children learn.

A further argument against the use of computers in education was that it is the computer that controls the learning experience and puts children through a pre-determined agenda. Many ECE teachers voiced strong opposition to the use of computers in the programme of learning. Teachers had pedagogical and philosophical concerns over formulaic software, limiting the holistic approach that underpins ECE services.

Burg (1984) posed the question:

And am I supposed to welcome microcomputers into my kindergarten? Why? So I can feed my students the watery pabulum or saturated fat of prepacked educational software? Sure the children will use the computer. It's a magical toy. But can computers develop skills and understandings for individual young children? Can the computer really add to the development of self-esteem, autonomy, and cooperation? (p. 30)

However, Papert (1980b) argued at the time that when using the LOGO application (a computer language specifically designed for use by children), children take control of their own learning. Papert advocated that when children use LOGO, they programme the computer and engage in thinking about their own thinking. Notably, this claim coincided with growing interest in the concept of metacognition (Flavell, J. 1979). Papert (1980b) stressed this approach to learning was about empowering the child to take control to lead their own learning across the curriculum. In many ways LOGO became the symbol for a whole new approach to education and quickly attracted a large following of teachers, especially in the United Kingdom and North America.

The idea of young children learning to programme was controversial and many studies were conducted to test the validity of the claims made about LOGO. There were few conclusive findings and research on LOGO was the catalyst for a major methodological debate throughout the late 1980s on appropriate research methods for studying educational computing requirements (Papert, 1987).

Importantly, Pea and Kurland (1984) claimed that skills learnt in one setting when using LOGO are not easily transferable to other settings. They advocated that the goals of programming, therefore, would be more relevant if they were connected with the wider curriculum. Nevertheless, despite unresolved debates, evidence from research on LOGO does indicate that when used appropriately computers do not take over children's learning (Pea & Kurland, 1984). In this regard, LOGO played a significant role in seeding early ideas about the way computers should be used in ECE settings as an empowering tool for learning.

Shade and Watson (1990) presented evidence to challenge some of the most often cited concerns for including computers in ECE. In particular, one concern they refute was that computers were not developmentally appropriate as children in their early childhood years were too young to understand or operate computers. However, some studies (Borgh & Dickson, 1983; Shade & Watson, 1987) provide evidence that young children could turn on and off a computer, insert and remove a disk, and engage in meaningful discussion about working with the computer, and work collaboratively in small groups.

Another issue widely debated was that the more highly developed the technology, the more difficult it becomes to operate and therefore a higher level of intellectual maturity is required (Elkind, 1987). Shade and Watson (1990) challenged this view, stating that if this were the case we would be less likely to see the exponential growth of home computers. They went on to suggest, "...that the more highly developed a technology becomes, the easier it is to use. From this perspective, then, computers become more accessible to young children as hardware and software become more sophisticated" (Shade & Watson, 1990, p. 378).

Physical development was also expressed as an area of concern. Cuffaro (1985) pointed out that when children work at a computer this is a sedentary activity and that when children are engaged in using ICT they are not being physically active. Issues of hand – eye fatigue, visual strain and children being exposed to infrared radiation were also raised as growing areas of concern in children's computer use (Brady & Hill, 1984). It is important to note that at this time few research studies were specifically focusing on the impact computers were actually having on children's physical development; however, observations in this area may have been included in wider studies (Fatouros, 1995). Of course, such concerns were understood by many proponents of ICT as nothing more than a new moral panic.

When reflecting over a decade ago how computers could be integrated into the learning programme (examining a pedagogy for ICT), Clements et al., (1993) claimed that early childhood teachers interested in using computers "stand at a crossroads. Will we use computers to reinforce existing educational practices or to catalyse

educational innovations, following NAEYC guidelines?” (p. 56). They suggested that research offered some direction as teachers began to explore appropriate ways of introducing technology into education programmes.

Clements et al., (1993) identified three pathways concerning the integration of computers into the educational programme. The first pathway was to use drill software (didactic software that delivers discrete problems within specific content areas) on the computer as a reward and made available as a separate part of the education programme. The second pathway, which is educationally plausible, was to integrate the drill and practice and other similar structured software into the education programme offered. The third pathway offered children the opportunity to use open-ended software such as drawing programmes and LOGO to extend their learning experiences on the computer. The first two pathways, while offering an easier option, were really about “teaching the same old stuff in a thinly disguised version of the same old way” (Papert, 1980a p. 353). When teachers followed the third pathway, they were innovative in their approach and endeavour to integrate computers in a timely and flexible way. As acknowledged by Clements et al., this pathway often provided a greater level of challenge in time, in effort, in commitment and in vision. This approach can provide an extension to the learning programme offered and have positive benefits for those involved. So by the close of the first wave there was a growing view that the use of computers in educational environments could be used to extend rather than supplement the existing curriculum.

In summary, there were many claims and counter claims about the value of educational computing during the first wave of ICT. However, relatively little empirical research was available during the first wave of interest to ascertain the benefits or drawbacks of using computers with children. Most of this research was conducted on LOGO where the focus was on older children. While during the 1980s there appeared to be a gradual acceptance of computers being introduced into the compulsory education sector, there were strong views evident that early childhood was not an appropriate sector for this technology. Conventional theory was also fuelling this debate as it was claimed that according to developmental theory children were not ready to use computers successfully until they reached the age of seven.

However, this conventional wisdom was coming under increasing pressure as a small but growing number of teachers were exploring creative approaches to engage children in leading their own learning through such technology. By the end of the first wave in the early 1990s, ICT had become a more accepted part of children's learning, but in the ECE sector the tipping point leading to widespread use and acceptability had yet to be reached.

### ***The second wave of ICT in ECE***

The seeds of the second wave of ICT in ECE can be traced to the mid 1990s when the National Association for the Education of Young Children (NAEYC) (1996) released a Position Statement, which urged early childhood teachers to “examine the impact of technology on children and be prepared to use the technology to benefit children” (p. 1). This Position Statement acknowledged that technology played an increasingly significant role in the lives of Americans and identified seven key areas of developmental concern:

1. software must be critically evaluated by teachers to ensure that it is age appropriate, individually appropriate and culturally appropriate;
2. computers are used to extend learning in a collaborative and interactive way;
3. computers should be integrated into the programme of learning “physically, functionally, and philosophically” (p. 2);
4. equitable access to the technology should be promoted;
5. diversity of the children should be affirmed through software and negative stereotyping avoided;
6. teachers and parents work in partnership to advocate for appropriate technology applications; and
7. opportunities for professional development that link curriculum, skill and integration of computers should be provided.

NAEYC (1996) provided some guidance to the early childhood sector in the United States and arguably this shared knowledge offered a starting point for the wider introduction of ICT into ECE worldwide.

In this position statement NAEYC advocated for teachers to have opportunities to engage in professional development; although Healy (1999) supported this view, she insisted that successful integration required substantial changes to philosophy, pedagogy and practice. Learning about the technology itself was only one aspect of what was required for teachers to become comfortable and knowledgeable in its use.

The recognition of the importance of pedagogy and the key role of the teacher role is a distinguishing feature of the second wave. Yelland, Grieshaber, and Stokes (2000) suggest that the potential value that ICT can add to the programme of learning is dependent on the choices the teacher makes regarding when and how to use the ICT available. Many authors write of the importance of teachers having an understanding of the technology itself in order to develop awareness about how they can integrate it in meaningful and authentic learning experiences for children (O'Hara, 2004; O'Rourke & Harrison, 2004; Patterson, 2004; Siraj-Blatchford & Whitebread, 2002).

Despite a better understanding of the conditions in which ICT contributes to learning, a strong level of resistance continued and many of the old arguments were recycled. Wellington (2005) identifies some of these recurring debates as the vocational, the pedagogical and the societal.

The vocational rationale is evident in the debates that exist around educational settings being viewed as a place to prepare children to work in a technology rich world. Healy (1999) claimed that the value of computers in the education sector had been vastly oversold to all stakeholders by organisations that benefit financially from adding computers and associated accessories to the educational setting. She suggests that belief spreads through society about the good of the digital age and it seems in the end “we don't own this idea it owns us” (p. 292). In a similar vein, Armstrong and Casement (2000) identify that public perception of the use of computers equates to high intelligence and success in life. They suggest that the media has contributed to

this widespread perception and this has resulted in a stigma being attached to those who refuse to participate in the digital age. There is also evidence of a growing rhetoric that children needed to be educated in the skills required of them to be successful in their future workplace and this of course includes ICT (Wellington, 2005). Parents naturally want the best for their children and have actively supported educational institutions in the funding of hardware and software and are purchasing home computers for their children's use (Wellington, 2005). As Wellington observes, there was widespread public perception that the ability to use a computer is a stamp in the passport to success.

The Alliance for Childhood (2000) strongly objects to this view. In a widely cited report they claim that the emphasis on technology is deflecting us from facing up to more pressing needs of society. They explain that in over 30 years of research there has only been one conclusive study that demonstrates added value through the use of computers and children's learning. Software applications that have a drill-and-practice approach have shown some evidence of improving narrowly defined skills. Echoed strongly in this document is that the introduction of computers into learning environments was unnecessary and "computers are viewed as the most acute symptom of the rush to end childhood" (Alliance for Childhood, 2000, p. 19). Although some of these populist claims were refuted in the academic literature (e.g., Clements & Sarama, 2003), as yet another unsubstantiated moral panic, the concerns continued to simmer away and resurfaced in yet another major report on the use of computers with young children (Alliance for Childhood, 2004). This report titled "Tech Tonic" adopts the view that the current use of ICT was unhealthy and claims a cure is needed. The authors go on to state: "the supposed benefits of this techno-revolution for children are restlessly promoted by high-tech corporations, even though independent research (conducted by those with no financial stake in the outcome) has produced little evidence of lasting, long-term gains" (p. 1). The key point is that controversy remains over the use of ICT by young children as illustrated in this seminal publication:

When it comes to the deeper education of our children, we often take the easy way out. We thrust computers into the hands of infants and toddlers and think that making them comfortable with hardware and software will prepare them for the future. It will not. (Alliance for Childhood, 2004, p. 4)

Even now debates continue to rage over the use of ICT in the education of young children. Monke (2007) recently wrote of the vocational imperative and suggests that the use of computers in education only achieved changing the value of the learners' physical worth to focus more on their intellectual worth. He insists that educational institutions are still in the business of preparing learners for the future and suggests, "schools today are commonly viewed as being in the business of developing human resources for a technologically driven twenty-first century workplace. Only the language, the century and the metaphor have really changed" (Monke, 2007, p. 6).

Monke (2007) also emphasises the importance of developing relationships and argues that there is a dehumanising impact of using a computer. He advocates that this problem is much deeper than the amount of social interaction that occurs when using the ICT but focuses more on the unique influence computers have on our thought processes. When using ICT students learn that they can control and manipulate the environment without moral or ethical consequence and Monke suggests that this relationship of manipulation and control may transfer to "real life" situations. He asks:

When everything he/she encounters on the computer is theirs to use, manipulate and discard, can we expect the computer-immersed student to treat others they engage through computer technology (or even off the computer) as autonomous individuals and not as things as well? (Monke, 2007, p. 7)

Monke maintains that many students engage in computer-related activities for substantial periods of time compared with the dwindling direct personal contact they have with other living beings, and asks why would this "instrumental mode of thought toward the world in general, and in all creatures, cultures and other 'resources' in it" (p. 7) approach not occur?

In contrast, Prensky (2001) puts forward a societal rationale as a counter argument. He suggests that today's students are the first generation to grow up with ICT being a natural part of their everyday lives and children have a right to be prepared for the future. As an outcome of this exposure, students think and process information differently from their predecessors. He claims this exposure has led to students whose

thinking patterns have changed and refers to these students as “digital natives” and to those without this exposure as “digital immigrants” (Prensky, 2001, p. 2). Prensky maintains that the older generation’s (or the digital immigrants) formative years lacked the exposure to technology that the digital natives have had and, as an outcome, are unappreciative of the skills the natives have learnt. This also has a reverse effect with the natives not readily understanding the challenge that learning these technologies can pose to a digital immigrant.

Over recent time, however, this suggestion has been critiqued by McKenzie (2007), who counter claims that Prensky has been quick to stereotype generations and lumps everyone together according to their year of birth, rather than the exposure they may have had to such technologies. Prensky also infers that digital immigrants can never attain this higher status of a digital immigrant, regardless of how much effort they apply. McKenzie (2007) also points out that Prensky (2001) does not offer a model to move forward in this dilemma other than through the use of gaming software which is increasingly being viewed negatively by these so called “digital immigrants”. So although the concept of the digital native has gained a large following in the popular literature, there is a danger of overly embracing this perspective in ECE. More to the point, the concept reflects a technologically deterministic view of the future as people are expected to keep up with the changes to technology (Williams, 1974). This view fails to appreciate that technology is part of society and not a driving force of change independent of other societal forces.

Although debates continue over the validity of the claims for and against ICT in ECE, over the last two decades a strong pedagogical rationale has emerged through the literature (Wellington, 2005). In short, the pedagogical rationale claims that teaching and learning can be enhanced through the use of ICT. An example of this rationale in the ECE setting is evident where teachers offer an integrated, flexible, active programme of learning and where ICT is used to support children’s ongoing interests in their world.

When considering this pedagogical rationale Siraj-Blatchford and Whitebread (2003) maintain:

The use of ICT in the early years has the potential to enhance educational opportunities for young children. It can be applied in a developmentally appropriate manner to encourage purposeful and exploratory play. It can encourage discussion, creativity, problem solving, risk taking and flexible thinking, and this can all be achieved in a play-centred and responsive environment. (p. 6)

At the same time teachers are expected to ensure children leave the education system with the technological skills and knowledge that will be required of them to be active citizens in the twenty-first century. Of course, the technological skills of the future may be very different from those of today and this driver continues to reflect the tension between a societal or futures rationale and one focused more squarely on pedagogy.

Yelland (2005) suggests this tension has posed many challenges for teachers with one of the main problems being that ICT can often be used as something that is “added on” to the learning experience to support children’s learning. Frequently the issue that emerges is that “instead of being a catalyst for change, new technologies have been in the main, mapped on to old curriculum that were conceptualised in different times” (Yelland, 2005, p. 206). It is further noted that although a large amount of information is available that advocates the use of ICT to transform learning, the curriculum remains the same in schools as it was a century ago (Tinker, 1999; Yelland, 2005).

Notwithstanding these concerns there is growing research to show that early childhood services worldwide have begun using ICT in their programmes of learning (Cox, Preston, & Cox, 1999; Downes, Arthur, & Beecher, 2001; Edwards, 2005a).

Moreover, there is evidence to suggest that innovative work is beginning to take place in many ECE settings (Lee, Hatherly, & Ramsey, 2002; Yelland, 2005).

For example Brooker (2003) argues that:

...there is increasing evidence that some of the most exciting and appropriate uses of ICT are to be found in early years settings, where there is less pressure to meet strict targets and more opportunity to experiment with child-centred practice. (p. 261)

Although controversy continues to exist in the early childhood profession regarding the use of ICT with young children, it would appear that technology is now experiencing its second wave of popularity in ECE, and it seems likely it is here to stay. The extent that ICT has become a routine part of ECE in New Zealand has yet to be established, but since the publication of *Foundations for Discovery* (Ministry of Education, 2005) there appears to be growing support for wider integration of new digital technology throughout the sector.

In summary, this section has explored recurring debates that exist around the use of ICT in the education sector. Many of these debates have mirrored those from the first wave of educational computing and more than two decades later continue to have an impact on the use of ICT in the education sector. The intersection between these debates and the growing acceptance of ICT along with the importance of the teacher's role are recurring themes. This section concludes that while ICT would appear to be here to stay a number of outstanding issues remain and there is still a need for further research to establish the true extent of ICT uptake within and across the early childhood sector.

### ***Multiliteracies in the twenty-first century***

As the previous two sections have demonstrated, ICT has been an area of growth across the education sector over the past three decades. Running parallel to this is the exponential growth of the use of home computers (Statistics New Zealand, 2007). Over time our ideas of literacy and texts “are being transformed by developing information and communication technologies” (O'Sullivan, 2005, n.p.). The key point is that the concept of literacy is not static.

As a consequence, we have also seen a changing view of what literacy actually is in the twenty-first century and consideration has been given to how parents and teachers might best support children in their literacy learning for today and the future. The New London Group (2000) provides some guidance on this matter and stress the “multiplicity of communication channels and increasing cultural and linguistic diversity in the world today call for a much broader view of literacy than portrayed by traditional language based approaches” (p. 60). It is becoming increasingly recognised that a singular label, “literacy”, does not encapsulate the complexity of the changes that can be captured by a plural label. The New London Group (2000) therefore used the term multiliteracies to describe this evolving phenomena. They defined multiliteracies as a set of open-ended and flexible multiliteracies required to function in diverse contexts and communities. This definition does recognise the diversity of ways in which literacy can be constructed in a world defined by rapidly changing ICTs and the increasingly global community where we regularly encounter cultural and linguistic diversity (Leu, Kinzer, Coiro & Cammack, 2004).

As Yelland (2005) points out, the introduction of these wide-ranging technologies has not only changed the way in which we can communicate but also enabled us to compose new texts and access information in multimodal ways that would not have been possible ten years ago. Kalantzis, Cope and Harvey (2003) stress that as an outcome of this diversification of how we communicate, the qualities of effective learners in the twenty-first century will need to change. Effective learners will need to develop new skills, knowledge, and more importantly dispositions that demonstrate persistence, creativity, and collaboration. Providing an educational programme and pedagogical strategies that facilitate the growth of this type of learner poses a challenge to the educational sector and will require, as Kalantzis et al. stress, changes to assessment and curriculum systems. What is clear, however, is that children of the twenty-first century are enthusiastic users of ICT and this use is affecting the experiences that they choose to participate in alongside of their developing understanding of literacy (Evans, 2004).

In summary, the wide range of technologies readily available today and changes in the way in which people communicate and compose new texts has led the New London

Group to propose a wider definition of literacy. The changing face of literacy and the multi-multimodal way in which people access digital information has implications for teachers in the twenty-first century. This is because learners not only need new skills and knowledge, but more importantly diverse intelligences. The high cognitive demands of the Digital Age will need to be fostered in order for the learner to be a successful and productive member of society. However, these changes pose a number of challenges for the programmes offered as well as the assessment practices that are applied as arguably traditional practices are inadequate to “measure the kinds of skills and sensibilities required in the new economy” (Kalantzis et al., 2003, p. 24). Of course, education is not strictly about preparing workers for future employment and importantly the concept of multiliteracies is centrally linked to developing more educated and well-rounded citizens.

### *Changing perspectives on learning*

We do not encounter the world as it exists in any neutral or objective sense outside of the realm of human experience...[T]he world is pre-interpreted for us by previous generations and we draw on the experiences that others have had before us. (Säljö, 1998, p. 51)

In this section the different conceptions of how young children learn and how these relate to the different approaches to ECE and the integration of ICT are explored. Constructivist theories of Montessori, Piaget and Flavell will be examined and how these theories continue to impact on education today. The use of apparatus through play with young children has had a long history. This section examines various theories of learning related to young children and their relevance for the use of ICT in early childhood settings. While there are many and varied theories of learning and while this section focuses on constructivism, social constructivism and critical theory, they are not seen as mutually exclusive. Other theories have relevance as Table 2.2 illustrates (see page 77). Over time theories of learning have evolved in response to new research findings and have moved forward to look at learning in different terms: “learning as a behaviour that can be controlled by external events; learning as individual cognitive activity; and learning as a social construct” (Cullen, 2001, p. 13).

### *Constructivism*

One of the early pioneers who used apparatus to support children's learning was Maria Montessori. Montessori was a medical doctor who worked with children with special needs. She based her emerging theory of child development upon the writings of Itard, Sequin and Froebel, who were all influenced by the philosopher Jean Jacques Rousseau (Crain, 1992). These educators all believed in the importance of allowing a child's interests to develop or unfold and in providing materials that would stimulate children's interests. Montessori argued that children do learn autonomously because of their own innate maturational processes and, therefore, it is incorrect to think that children are merely what the teacher makes them. Importantly, Montessori pointed out that children actually think and learn differently to adults (Montessori, 1936).

Maria Montessori developed an educational method to implement her philosophy in 1907 that predated and laid the foundation for constructivism. This early constructivist approach was reflected in the emphasis she placed on the child actively engaging in an activity where they were involved in constructing their knowledge and intelligence. According to Montessori (1949), at times children experience large steps in acquiring certain abilities in their early childhood years and can be particularly responsive to certain stimuli or interactions. Borrowing a term from biology, Montessori described these times as 'sensitive periods' after similar developmental stages in animals. She stressed the significance of this to children's development in the early childhood years (birth to age 6 or 7). The idea was quite radical at the time and "took many years, following Piaget's extensions of Montessori's initial explanation, to become generally accepted in child psychology" and is readily applied to educational settings today (The Montessori Foundation, 2007, n.p.).

These 'sensitive periods' are genetically programmed periods of time when children are intently interested in an experience often at the expense of all else. The experience leads to ongoing interest and persistence with the task leading to creativity. Sensitive periods include children focusing on movement, language and orientation to order. Montessori (1949) explains that these 'sensitive periods' are connected to children's brain development and enable the child to absorb this new knowledge. When brain development has gone past this point children must be taught the skill/ability. As an

outcome, Montessori placed great emphasis on the importance of teachers observing children's behaviours that indicate they are in a sensitive period and the activities they engage in to ensure that they can support children in their endeavours to guarantee the greatest gains (Montessori, 1966).

There are two key aspects to the Montessori 'method': (a) the environment which includes educational materials; and (b) the teachers. The environment must be designed to support the child in their endeavours and all obstacles must be removed. It is the role of the teacher to provide this carefully prepared environment and to participate alongside of the child within it (Lillard, 1972). However, Kilpatrick (1914, cited in Smith, D., 2005) critiques the Montessori approach for its over-reliance on didactic materials with little opportunity for children to engage in creative or imaginative play / work. Montessori argued that those who engage in fantasy play have lost their tie to reality. Crain (2004) explores this view in greater depth and suggests that this approach would appear to contradict one of Montessori's (1917) basic beliefs which was to "follow children's natural inclinations" (p. 81). Montessori urged that it was the educator's role to assist the child in developing their ability to discern and judge situations, and engaging in fantasy play was not conducive to developing these skills.

Montessori's developmental theory (1936), like Piaget's (1967), was influenced by a study of biology and notions of organicism as proposed by Rosseau (cited in Cleverley & Phillips, 1986). Her use of apparatus in education was influenced strongly by the work of John Locke (1632-1714), whose theoretical viewpoint suggested that children learn through experience (sensation and reflection). Logically it was ascertained that reflection could only occur after there had been some input into the senses and this led to a demand to train educationalists in what is termed the Lockean theme. Throughout history this training evolved to the use of "special apparatus and sense exercise devised by Maria Montessori (1870-1952)" (Cleverley & Phillips, 1986, p. 21) which, with some modification, still remains an important component of the Montessori method today. Montessori's view was that the materials offered to children should be meaningful and provide stimuli that engages the child and instigates a process of concentration (Lillard, 1972). Within this educational

approach it is vital that the teacher provide educational material to the child at the right time which is during the 'sensitive period' and this is determined through observation. Montessori's educational approach focuses on the cognitive value of play in a context where children take an interest, persist with challenge, and control the direction of their learning. Because all materials are matched to the child's individual needs and interests the teacher must be flexible in their approach. Pedagogically, at the time this idea was seen as revolutionary – the focus on the child as the starting point of the educational endeavour and the consideration that was given to them as holistic beings led to teachers taking a role as a facilitator in the child's journey.

The 'learner centred' ideology that guides the Montessori approach is based on the premise that the child actively engages in the learning process and it primarily focuses on individual children's learning. Montessori's (1964) historical use of equipment to educate children has implications for the use of ICT in ECE. Traditionally Montessori equipment has been used to engage children in investigation and discovery and with refinement (for the individual) has assisted in focusing children's interest intently on the task (Crain, 2004). With the introduction of ICT into the learning environment an alternative way to learn is offered that also involves learning through the senses. As Epstein and Epstein (2007) point out, "a computer is like any other didactic materials, [it] is a tool with which to think, investigate, explore, communicate, express ideas and to solve problems" (n.p.). This approach to learning supports the constructivist approach offered in the Montessori curriculum, where children are involved in constructing their own knowledge. Although, it is important to point out that while the link between ICT and the Montessori is possible it is not straightforward as computers are seen to represent the adult world, and therefore, do not fit with the Montessori philosophy.

In an attempt to consider more fully the skills that are often viewed as leading to learning, constructivist theories emphasise the active role that children play in forming their own interpretations of how they see the world (Piaget, 1967). Piaget's view on maturation and children's increasing capacity to understand the world has been enormously influential in educational theory. Notably, Piaget was influenced by

Rousseau's and Montessori's maturational stage theories of development (Crain, 2004). Piaget was a stage theorist and believed that through maturation, children's development would unfold through a series of four universal stages. The order of these stages was always the same (Gonzalez-Mena, 2008). Piaget was in agreement with Rousseau and Montessori who advocated for children to engage in active exploration of the learning environment (Crain, 2004).

Piaget closely studied the progressive changes that children went through in both behaviour and thinking at different stages in their development and even suggested rough age-ranges for each (see Piaget & Inhelder, 1969). He believed that the experiences children engaged in should be targeted towards their stage of development. Smith, A. (1992) suggested that the descriptions of children's achievements at various stages still continue to influence our expectations of what is perceived as normal development today. Over time, however, Piaget's theory on the stages of cognitive development has been challenged as studies that have been undertaken cross culturally show evidence that all children do not proceed through these stages at the same rate with an emerging view being that stages of cognitive development are not universally applicable (Donaldson, 1978). Piaget's work has also been criticised for underestimating the abilities of young children and the types of abstract directions and requirements he placed upon them in his study were not conducive to achievement. More recent studies have shown that under simpler conditions children can achieve (Gelman, Meck, & Merkin, 1986), especially if they are given some coaching on the task (Donaldson, 1978). Cullen (1994, as cited in Cullen, 2001) concludes "the research that challenged this view of the young child's cognitive deficits played an important part in rethinking the philosophy underpinning early childhood education" (p. 51).

Piaget (cited in Smith, A., 1992) was particularly interested in the "structure of intellect" and he defined this as "the underlying organisational properties of intelligence that determine what behaviour will be" (p. 21). Piaget argued that thinking processes develop in response to a need to make sense of the world. Information is gained through the environment but what is learnt is dependent on the knowledge that that is brought to the situation (Gauvain, 2001). Piaget (1962)

proposed the twin mechanisms of assimilation and accommodation. Assimilation is where new information is absorbed and converted to fit existing and constantly changing mental structures (accommodation). However, subsequent critical research, termed Post-Piagetian, has continued to build on cognitive development theories and a second dominant approach is known as information processing (Gauvain, 2001).

Information processing refers to the study of how we take in, store and retrieve information from our memories. Learners require exposure to stimuli to gain information, which will reside in their short-term memory. If the information is used frequently then it is transferred into the long-term memory. Information processing theorists propose that the human mind has many similarities to a computer. It is able to process information through using logical rules. However, just like the computer, the mind also has a limited capacity for how much information it can store and process (Snowman & Biehler, 2003). Cognitive change occurs over time as a result of this finely balanced practice (Flavell, J., Miller, & Miller, 2002). This approach views a human being as a complex cognitive system autonomous in nature and this is seen as a virtue of this theory (Flavell, J., 1977).

Gauvain suggests “a hallmark of information processing approaches is their attention to change” (2001, p. 27). For just as a computer can be upgrade and more memory, hardware and software added, so do children’s brains continue to develop and be receptive to new information. The two aspects that have predominately been of focus in this research include how particular skills are acquired and the increase in the capacity of information that can be processed (Miller, 1993, cited in Gauvain, 2001). Using the information processing approach, change is often focused around a task and is a concentrated effort lasting for a short period of time; these are considered to be shortcomings of this theory (Gauvain, 2001). A similarity that exists between Piagetian theory and information processing is that neither view considers the implication of the broader social and cultural context on learning. In prior research the context in which the child learns was rarely viewed as relevant and this has been raised as a critique of the work of Piaget and others.

At this point it seems appropriate to remember that although Piagetian theory has been substantially criticised in the process of understanding its implications, this

theory continues to provide a foundational basis for studying children's development (Tzuo, 2007). As Crain (2004) summarises, many theorists have critiqued the work of Piaget; however, this is considered a testament to "the statue of Piaget's theory" (p. 180).

As stated, Piaget has greatly influenced educational theory and this continues to have an impact on the design and thinking underpinning ECE programmes (Carr & May, 1991). For example, in the first wave of ICT a common interpretation of Piaget's (1953) developmental theory was that children should not use computers as in order to use technology successfully they must first reach the concrete operational stage (age 7-11 years).

Piaget advocated that it is not until this age and stage that children are able to think through a task in their heads rather than physically carry it out. Because of this children are able to use symbols to carry out these cognitive tasks, to think logically and to consider multiple perspectives of a situation. While the development of these skills would be beneficial in assisting the child to successfully operate a computer, it is now known that children's development is not so tightly related to their age and environmental influences can have a major impact on their learning.

Environmental influences include the ability to access technology. Marsh, Brooks, Hughes, Ritchie and Roberts (2005), conducted a study in England in 2004-2005 that explored young children's use of popular culture, media and new technologies in the home. The findings highlight that children were immersed in media rich homes and children were also avid users of a range of technological applications. It identified that as children engage in family social and cultural practices their learning of technology is either implicitly or explicitly supported and extended by their parents' and other family members. Children have thus access and mediation of ICT in the home environment, which supports their developing literate cultural capital.

### *Social constructivism*

In the latter part of the 1980s cognitive psychology was becoming more widely accepted as it addressed how children learn in a social context. Although active

constructivist views of learning were growing in support, minimal attention was still being given to the importance of context (Cullen, 2001). During the 1980s conventional views of learning were being challenged coinciding with the 1978 English translation of Russian psychologist Lev Vygotsky's work *Mind in Society*. This date marked the beginning of a strong interest in socio-cultural theory of learning (Cullen, 2001) although his works were translated in 1962. The central focus of a socio-cultural approach to teaching and learning is relationships with adults and peers and the social context in which children learn. Children were no longer viewed as 'lone scientists' unravelling what things meant for them but were now viewed as social beings that learnt about their world through their culture and their interactions with others (Smith, A., 1992). Vygotsky's theories relating to the zone of proximal development and access and mediation have implications for the research that has been undertaken and will be discussed further.

Vygotsky, like Piaget, noted the importance of children engaging in active learning but stressed that learning is an interactive and constructive activity. He located this learning within a social context and advocated that "knowledge is constructed as a result of this social interaction and then internalised" (Tzu, 2007, p. 35). In his writings Vygotsky referred to the importance of developing a pedagogy for the future in child development rather than dwelling on past approaches and this is where he advocated working with children within their zone of proximal development (ZPD) (Fleer, 2002). This term refers to the distance between what an individual can do alone and unsupported and what they can achieve with the help of a more knowledgeable adult or peer. Gauvain (2001) concludes, however, that Vygotsky's work on ZPD focuses more on the experienced partner than the learner and as an outcome paid less attention to how this information can be understood with regards to cognitive development structures. Gauvain proposes that this can reduce the learner to little more than a recipient of the experienced partner's knowledge.

Rogoff (1990) describes the concept of ZPD as "guided participation" (p. 16). This view claims that cognitive change occurs as children participate with more knowledgeable or experienced peers in intelligent activities. As children participate in this activity, the balance of knowledge shifts and, as an outcome, so too do the

roles and responsibilities of the task they are engaged in (Rogoff, 1996). Gauvain (2001) summarises: “in this view, children’s participation in the organised routines and practices of the social community contribute right alongside more didactic interactional experiences to cognitive development” (p. 38). Rogoff (1998) suggests that the concept of guided participation has been offered as a perspective (rather than a technique) through which learner’s diverse processes of participation can be examined. Taking this view, learning is seen as a process of participation with others involved in a socio-cultural activity, cultural tools and practices of their community, through which change occurs for all those involved. Rogoff (1998) critiqued the Vygotskian concept of ZPD as focusing on the didactic approach in which it is taught, suggesting this may be an outcome of the emphasis he has placed on the “learning of academic concepts” (p. 700). As a consequence, Vygotsky may have missed implicit messages that are shared with the learner through the cultural context and the activities in which children engage.

Bruner’s concept of scaffolding (Wood, Bruner, & Ross, 1976), which was a term derived from Vygotsky’s work on the ZPD, is a specific technique to pass knowledge from the expert to the learner. The scaffolding model is common in many early childhood settings and is a term many teachers refer to frequently when reflecting on their practice and the strategies they have employed. In scaffolding, the purpose of the adult or a more skilled peer is to support the child to actively construct meaning towards the level at which they are capable of working. As the child’s competence develops, the adult or more skilled peer gradually releases control and allows the child to accept responsibility for the task (Wood et al., 1976). Yelland and Masters (2007) identify that the scaffolding process is dynamic in nature and requires modification to suit individual situations (i.e., how big the task is and the learners own ZPD).

However, a number of key characteristics that aid the scaffolding approach can be identified, i.e., that the interaction is collaborative, the scaffolder must ensure the task is within the learner’s ZPD and that support for the task is gradually withdrawn as the learner’s competence increases (Yelland & Masters, 2007). A perceived danger of this approach is that teachers and parents will become very focused on what children should know (in the future) rather than celebrating and helping to consolidate learning

as it occurs (Crain, 2004). A second major critique of Vygotsky's (1934, cited in Vygotsky, 1978) educational philosophy is that he has overlooked the extent that being tutored by a more experienced peer seeks to undermine a child's developing sense of independence. Crain (2004, p. 245) reminds us that, "developmentalists have repeatedly warned that when we give children assistance and direction, we encourage them to depend on others to know what and how to think, undermining the ability to think for themselves."

O'Rourke and Harrison (2004) explored the concept of scaffolding in a study that investigated the introduction of new technologies into ECE in Australia. In this study, two strands of research were conducted: these included a collaborative approach between the teachers and co-researchers; and a more traditional approach where 98 questionnaires were administered. A two-day introductory workshop was held where research clusters were formed to explore topical ICT issues in ECE. During year one 192 teachers across three states developed action research case studies to complete in their own ECE services. Research foci explored issues such as gender and ICT use, pedagogy, equity and social skills. In one of the case studies teachers reflected on how they had paired children together strategically to enable a child who was more confident and competent with the computer to scaffold a less able child. Findings indicate that over time the children took greater control over the entire process and children regularly were involved in setting up their own support (buddy) systems.

In contrast to scaffolding, co-construction of knowledge is where both the more experienced peer or adult and the child can learn alongside one another where they are involved in jointly constructing this new knowledge. This approach is well suited to using ICT in early childhood education. For example, research by Downes et al. (2001) explored the educational use of the Internet with children eight years and under and found that both teachers and peers could provide varying levels of modelling, scaffolding and challenge when participating in such an experience. In this situation, it is important that the teacher has confidence in using ICTs and some content knowledge in order to successfully support and extend the children's learning (Downes et al., 2001; Edwards, 2005b). Hill and Broadhurst (2002) put forward an alternative perspective when considering concepts of scaffolding and ZPD and how

they might relate to the use of ICT with children. They stress that teachers engaged in scaffolding learning or working in the ZPD have an objective in mind for the child's learning. The issue with this is that often children have a greater understanding of the use of these technologies than the teacher and, therefore, instead of the adult being the more knowledgeable or experienced member of the group, more often the child is.

In summary, Vygotsky has highlighted the importance of children having access to both equipment and mediation by others if learning is to occur. Vygotsky's ideas on the social nature of learning have been very influential as they offer new ways to both explore and expand traditional views of developmental theory (Crain, 2004). He has presented an eclectic approach for education and left a legacy that we need to consider both "intrinsic and environmental variables when we study development" (Crain, 2004, p. 243).

### *Critical theory*

An alternative theoretical approach to constructivist and social constructivist is that of critical theory. Critical theory is generally defined as the diverse body of work produced by "Habermas and to a lesser extent, his predecessors in the Frankfurt school" between 1939 and the present (Cohen, Manion, & Morrison, 2000, p. 28). Within critical theory there are many different theoretical schools (feminist, Marxist, deconstructionist, etc), some of which are in open hostile disagreement with each other. The aim of critical theory is to decrease domination and increase freedom in modern societies.

Critical theorists argue that all knowledge is influenced by dominant sources of power (Crowther & Green, 2004). Therefore, all knowledge is broadly political in nature. This theoretical paradigm claims that knowledge is shaped by human interests and cannot be viewed as independent from these interests. Knowledge that is presented as final or certain is singled out for critique and criticism. This is because the place of critical theory is to generate new forms of knowledge, particularly those shaped by political or ideological assumptions. Its purpose is transformative: to help to improve the understanding of society in order to make positive changes. As Cohen et al., (2000) insist, Critical Theory "seeks to emancipate the disempowered, to redress

inequality and to promote individual freedoms within a democratic society” (p. 28). The role of critical theory is to illuminate issues of “legitimacy and equality issues of repression, voice, ideology, power, participation, representation, inclusion, and interests” (Cohen et al., 2000, p. 28). Critical theories are not without their critics. One such criticism is that it fails to justify itself as being “better than other theories of knowledge, science or practice” (Nichols & Allen-Brown, 1996, p. 243). Likewise, critical theories have been maligned for the amount of theoretical jargon used, thus creating a barrier of access to a body of knowledge to those for whom it may be of most benefit (Tyson, 2006). Counter claims have, however, argued that the terminology used is accessible to oppressed peoples and by making the language clearer and less academic, the language becomes anti-intellectual (Nichols & Allen-Brown, 1996). The most criticised weakness of critical theory is that it always deals with issues at an abstract level: only rarely do critical theorists offer reasoned alternatives to the cultural complexities involved in capitalism or democracy (Bowers, 1993, cited in Nichols & Allen-Brown, 1996).

Regardless of these identified shortcomings of critical theory it is still a useful approach to examine issues of social status, ethnicity, gender and the more recent phenomena of globalisation and the knowledge economy. Brown (2004) has claimed that ICT is a digital lubricant for the knowledge economy and critical theorists understand that technology is never neutral. This is the major implication for the use of ICT in ECE. It is evident that technology plays a major role in this globalised world. Society has instantaneous communication across countries which is often accompanied by images and sound. The knowledge society is also associated with developments in ICT and globalisation. Societies are able to digitise many forms of information (including money) and move it around the globe with ease and speed. Boundaries between countries are blurring and people’s identities and methods of sharing these have become more complex (Gilbert, 2005).

Over several decades both the type of information and how it is learnt have changed considerably. The creation of knowledge has grown exponentially in many areas of life and its relevance now has a significantly reduced life span (Siemens, 2004).

Gonzalez (2004, cited in Siemens, 2004, p. 1) speaks of the challenges that this reduced lifespan of knowledge poses:

One of the most persuasive factors is the shrinking half-life of knowledge. The “half-life of knowledge” is the time span from when knowledge is gained to when it becomes obsolete. Half of what is known today was not known 10 years ago. The amount of knowledge in the world has doubled in the past ten years and is doubling every eighteen months according to the American Society of Training and Documentation (ASTD). To combat the shrinking half-life of knowledge, organizations have been forced to develop new methods of deploying instruction.

Siemens (2004) supports this argument and has suggested the networked learning model of connectivism to cope with this deluge of knowledge and to engage learners actively in the learning process. He writes that “the capacity to form connections between sources of information, and thereby create useful information patterns, is required to learn in our knowledge economy” (Siemens, 2004, p. 3).

Technological advances, however, pose their own challenge to society. Therefore, it is important to consider ICT through a critical lens as “critique challenges many of the taken for granted assumptions, beliefs, ideologies and discourses that permeate” the ICT phenomena (Richardson, Tapia, & Kvasny, 2006 p. 4). It is at this point that critical and relevant knowledge and a practical understanding of ICT in education can be used to facilitate emancipatory change.

As Makin (2007) explains, hierarchical structures (and differential power relationships) exist within any society and may be based on “birth, wealth, knowledge, language, gender or ability” (p. 5). She suggests that as an outcome children’s challenges in life are not equal. Makin goes further, claiming that literacy is one of these challenges, with children from “cultural minority groups or minority language backgrounds and children living in poverty at particular risk of low literacy achievement at school” (p. 5). Low literacy achievement can have life-long consequences as there are “clear correlations between this and a range of social problems such as school drop-out rates, unemployment, substance abuse and incarceration” (Makin, 2007, p. 10).

In the world of business, technology and technological literacy play a vital role in the country's international competitiveness and key skills of the knowledge economy (Wellington, 2005) and it could be argued that these are an important aspect of a child's education. The question is whether it is wise for a country as small as New Zealand to focus all resources on this one future of education? It is important to remember, however, that the relationship to literacy and economic development is very complex and that literacy is only one of the many variables in the achievement of social and economic benefits (Lankshear & Lawler, 1987).

In the twenty-first century many children are enthusiastic users of ICT and it is important that educational settings foster the multimodal ways in which literacy can be taught, for example through the World Wide Web, video captioning, or interactive media (New London Group, 1996). Historically, the knowledge, skill and attitude to use ICT successfully in ECE settings has not been part of teacher education programmes and, therefore, many teachers are apprehensive in their approach to use these technologies as part of their teaching (Hill, 2007). It is vital that teachers develop an understanding of the broader sociological issues that relate to literacy and through doing so develop an understanding that literacy is "inextricably linked to social, political and cultural conditions" (Jones-Diaz, 2007, p. 39).

Education policies are strongly influenced by the social, political and cultural conditions of the time and national policy documents have become concerned with being more competitive and ensuring greater synergy between education and the economy (Peters, 2001). As an outcome the concept of the knowledge economy has been pushed upon the education sector with little if any public debate about whether it is the approach society wants for their citizens. Peters advocates that it is important that educationalists take the time to engage with policies that push an ideological drive for preparing students for life in the knowledge economy, engage in informed critique and consider what the social consequences of such policies might mean.

This section has reviewed theoretical approaches that have underpinned education in New Zealand both traditionally and more recently. In this next section we turn our attention to the way in which these theories have been applied in ICT in the context of ECE.

## *ICT in the context of ECE*

Curriculum defines what counts as valid knowledge, pedagogy defines what counts as valid transmission of knowledge and evaluation defines what counts as a valid realisation of this knowledge on the part of the taught. (Bernstein, 1971, p. 85)

This section discusses the New Zealand early childhood curriculum *Te Whāriki* (Ministry of Education, 1996a) from inception to current day use. Socio-cultural assessment practices are critiqued and the use of ICT in Centres of Innovation (COI) and Assessment will be discussed. The ICT framework *Foundations for Discovery* (Ministry of Education, 2005) is explored and potential alignment between the framework and the curriculum is identified. Contemporary research on the use of ICT with young children is critiqued and research relating to the perceptions of teachers, parents and children will be discussed.

### *Te Whāriki – The early childhood curriculum*

ECE in New Zealand has evolved over time, in response to the shifts within the sector, changing needs of society, changing policies, national and international research and other imperatives for the quality education of young children. A significant development over this time was the release of the early childhood curriculum document *Te Whāriki* (Ministry of Education, 1996a). The curriculum was the result of wide consultation with the ECE sector both nationally and internationally (May & Carr, 1996). As an outcome, a strong feature of this document was that it encapsulated multiple perspectives of curriculum from diverse services and organisations (Nuttall, 2003a).

The title of *Te Whāriki* which literally means a ‘woven mat’, was suggested by Tamati Reedy as a central metaphor (May, 2002). *Te Whāriki* was envisaged as a mat that had multiple viewpoints and approaches woven into its very fabric. The principles, strands and goals provided the framework from which many patterns dependent on the philosophical underpinnings of the centre were created. May (2002) suggests that *Te Whāriki* provided signposts for early childhood communities to develop their own approach to the curriculum. This approach is evidenced in the

definition that is provided for curriculum in *Te Whāriki* which is “the sum total of the experiences, activities and events, whether direct or indirect, which occur within an environment designed to foster children’s learning and development” (Ministry of Education, 1996a, p. 10). While it is clear this approach and definition to curriculum resonates with the holistic discourse of New Zealand practitioners, it has been critiqued for lacking guidance in what to teach, how to teach it and what knowledge teachers require to be successful in aiding learners (Hedges, 2002). A similar view is offered by Mutch (2003) who suggests that the integrated approach to curriculum strongly influences the pedagogy as teachers are required to be generalists. Cullen (2003) also reminds us that when following a holistic approach to learning, children’s interests are often the catalyst for programme planning. In a traditional play-based programme, children’s interests have the potential to be narrowly interpreted, particularly if teachers make no attempt to liaise with the family over such interests and extend across settings. Cullen (2003) goes further, suggesting that failing to “understand the socio-cultural origins of children’s interests has led some teachers (and commentators) down byways that diverge from the path of holistic learning” (p. 281).

*Te Whāriki* (Ministry of Education, 1996a) is a bicultural curriculum with a central focus on the child developing and learning in various contexts. ECE teachers acknowledge and accept these wider life experiences and seek to integrate them into the ECE programme offered (Ministry of Education, 2004a). *Te Whāriki* is based on a socio-cultural perspective, which recognises that learning experiences do not just have to be developmentally appropriate, but nationally, culturally, individually and educationally appropriate (Ritchie, 2003). *Te Whāriki* was intended to be delivered in a non-prescriptive manner (Duhn, 2006; Nuttall, 2003b) and is offered in the early childhood settings in such a way that best meets the needs and interests of the individual or group. The outcomes of the curriculum are knowledge, skills and attitudes and are indicative rather than definitive. In a holistic approach to learning both the process of learning and what is learnt are emphasised and knowledge, skills and attitudes are integrated components. When considering these aspects as a whole, a child’s ideas based on their experience which is commonly known as their ‘working

theory', may become evident and assist the child in further developing their thought processes and a positive attitude and approach (disposition) to learning (Ministry of Education, 1996a).

As stated above, *Te Whāriki* is underpinned by a socio-cultural approach (Carr & May, 1993) and current conceptualisations of socio-cultural theory draw heavily on the work of Vygotsky (1978). This foundation does have implications for teachers in all areas of the education sector, as a key feature of this theory is that higher order functions develop as a result of social interaction. Vygotsky urged that consideration must be given to the child's world outside of the education environment as their learning is embedded within these social events. The key contexts of a young child's life are generally their family, early childhood setting and the community. It is also clear that wider societal issues and government policies also affect a child's life. Apparent in the document is a focus which is inclusive of culture and "a more community spirited view of the child" (Fleer, 2003, p. 256). In contrast to this is the continued focus on the child's interests, which remains dominant. Fundamental to socio-cultural theory is that learning is a collaborative process and firstly situates learning occurring in the child's world and then as an internalised individual experience. However, as Fleer (2003) argues, mixed messages are evident in the introductory section of *Te Whāriki* where it is stated, "it is about the individual child. Its starting point is the learner and the knowledge, skills, and attitudes that the child brings to their experiences" (Ministry of Education, 1996a, p. 9).

Cullen (2003) identified that *Te Whāriki* (Ministry of Education, 1996a) is a complex document, which has posed many challenges for practitioners who have endeavoured to interpret it to guide their practice. She explains, "while its principles, strands and goals reflect many theories and constructs, academic and professional debate is currently foregrounding its socio-cultural and postmodern ethos" (Cullen, 2003, p. 271). This point highlights that children's learning is embedded within society and culture and emphasises children engaging in authentic learning experiences and the social interaction in which learning occurs. Running parallel to this focus on socio-cultural learning are postmodern theories, which bring a critical perspective to a single perception of quality early childhood experiences and is in agreement with an

increasing dissatisfaction of a normative approach to practice (Cullen, 2003). This theoretical position is significant to note considering the earlier draft of *Te Whāriki* (Ministry of Education, 1993) was strongly influenced by a focus on developmentally appropriate practice (Cullen, 1996; McNaughton, 1996). Fler (2003) points out that substantial amounts of the text and the way in which the draft curriculum (Ministry of Education, 1993) was framed made this developmental view very apparent. The draft publication of *Te Whāriki* (Ministry of Education, 1993) was subtitled ‘developmentally appropriate practice’, thus emphasising the strong underpinning this theoretical approach had in the formation of the curriculum. On the face of it there was a significant theoretical shift in orientation to the curriculum between the first and final drafts of the curriculum in 1993 and 1996.

Many theoretical voices are evident in *Te Whāriki* and Fler (2003) suggests that this is both a strength and weakness of the document; the strength being that no single approach is advocated in curriculum design. Teachers are empowered to use their professional judgement in designing programmes of learning that are responsive to the community in which they teach. Fler also maintains that this is also a weakness because with so many voices you are prompted to ask, are they being heard equally? Do they agree or disagree? Moreover, one could ask if teachers, in fact, only hear the voices within the curriculum that best fit with their theoretical and philosophical view of how children learn.

Although the curriculum has received a great deal of support from the sector, this complex curriculum has posed a number of challenges for early childhood teachers as they have worked to interpret it and integrate it into their teaching practice (Cullen, 2003). The early childhood sector in New Zealand is very diverse and incorporates both trained and untrained educators. *Te Whāriki* has its own terminology and doctrine and Keesing-Styles (2002) questions whether this inaccessible discourse excludes some parents and practitioners. Over recent times changes to policy have included a focus on increasing benchmark qualifications in the early childhood sector and Cullen (2003) questions if this structural change would be enough to enable teachers to implement *Te Whāriki* successfully.

With the introduction of *Te Whāriki*, it was clear that a new approach to assessment was required, as typical assessment approaches had focused on summative practices that measured children's acquired knowledge and readiness for school (Carr, 2003). Assessment had also been identified as being problem-orientated, as a survey conducted in 1993 of assessment practices revealed (Wilks, 1993) and this was in conflict with the credit-based approach advocated in *Te Whāriki*. Accountability expectations increased after the release of *Te Whāriki* (Ministry of Education, 1996a), and the *Desirable Objectives and Practices* (DOPs) (Ministry of Education, 1996b) for licensed services and centres in 1996 also conveyed government expectations of assessment practices.

In 1998, the Ministry of Education sponsored two projects to assist in informing new approaches to assessment (Carr, 1998; Ministry of Education, 2004a). In the first project, the learning story framework was developed (Carr, 1998). The learning story framework uses a socio-cultural approach to document a narrative about the learning that is taking place. This approach considers both the context and the people involved in the story as all contribute to the learning. The second, the Early Childhood Learning and Assessment (Exemplar) Project commenced in 2001 with the resulting initial eight books (Ministry of Education, 2004a) being released to the early childhood sector in February 2005. A further 12 books have been released over subsequent years (2005, 2007, 2009). These exemplar books have been used as a professional development tool to assist teachers in assessment of children's learning in ECE.

#### *Learning and assessment*

*Kei Tua o te Pae – Assessment for learning* (Ministry of Education, 2004a) is a professional development resource commonly known as the early childhood exemplars, which help to guide the assessment process undertaken in the ECE setting. The purpose of assessment defined in this resource is to provide informative and useful information to assist in guiding the ECE programme offered. The exemplars promote the idea of noticing, recognising and responding to children's interests during authentic and meaningful learning experiences and promote the use of the learning stories framework developed by Margaret Carr (2001).

Teachers then interpret these learning stories using their professional knowledge and understanding of the early childhood curriculum. Nuttall (2005a) points out that because of the highly interpretive nature of this form of assessment, teachers have a great deal of responsibility in identifying and analysing these interpretations. It is clear that all of these narratives (learning stories) can be interpreted from multiple perspectives, but, ultimately, it is the person recording the story who holds the power. This person has decided what was important to notice and has then carried out the process of identifying what is significant in the learning episode. Nuttall (2005a) identifies that the “highly interpretive nature of the exemplars is both their strength and weakness” (p. 66) and that some teachers focus primarily on the dispositional aspects of children’s learning at the expense of noticing children’s growing domain knowledge, such as literacy or technology.

*Kei Tua o te Pae* is a resource designed to assist teachers in exploring some of the key questions about children’s learning. It also highlights how children and families can contribute to this assessment and ongoing learning. Currently, there is no formal evaluation of its effectiveness, although some critique of the effectiveness of learning stories as a primary assessment tool is becoming apparent (Nuttall, 2005b). Recently, the Education Review Office (2007) reviewed the quality of assessment practices in 389 early childhood services in New Zealand in terms three and four of 2006. The findings indicate that the quality of assessment varied considerably across centres and in one third of centres was not working well.

Similarly, in the UK, the importance of formative assessment and formative feedback during activities was identified in a study in teacher effectiveness (Siraj-Blatchford, Sylva, Muttock, Gilden, & Bell, 2002). This study highlighted that the “most effective service shared child related information between parents and staff, and parents were often involved in the decision making about their child’s learning” (Siraj-Blatchford, et al., 2002, p. 4).

ICT has been used as a tool more recently in ECE to enhance the curriculum and assessment practices and to attempt to make the learning that is occurring for

children more visible (Lee et al., 2002). This documentation then becomes part of the formative assessment with children who can draw on this documentation or digital artefacts to revisit and reflect on prior learning experiences (Ministry of Education, 2005). This information can also be used as a method of conveying information to parents about the way their child chooses to spend time in the ECE setting.

### *Seeding the growth of ICT*

In 2002 the Early Childhood Strategic Plan, *Pathways to the future* was released by the New Zealand government (Ministry of Education, 2002). This is a plan that maps the direction of early childhood for the next ten years. One of the three core goals at the centre of this plan is to improve the quality of early childhood services. This goal reflected the need to develop a strong New Zealand research base to inform and develop models of good teaching and learning. In 2002, COIs were established by the Ministry of Education across the country to foster research and development in the ECE sector. One of the indicators used in selecting the initial round of six centres was to “develop and distribute quality teaching practices with the use of ICT” (Ministry of Education, 2002, p. 15). A direct outcome of this criterion is that there have been a number of ECE services leading the field with regard to innovative use of ICT in ECE settings. A requirement of the COIs was that they would look for opportunities to disseminate their findings. Doing so has not only raised the status of ICT but in many instances has highlighted how new digital technology can be used to foster metacognitive practices and document children’s assessment of learning. COI have not been without controversy (Ministry of Education consultation meetings, personal communication, October, 2004). These ECE services received additional funding for being a COI (e.g., for equipment) and arguably this fact often acts as a barrier (directly or indirectly) for the wider adoption of ICT. After all, it does little or nothing to dispel the view for many ECE services that ICT is an expensive commodity and not a scaleable approach for all centres. Of note is that all COI were summarily stopped by the incoming National Government in June 2009.

A substantial increase in ECE services using ICT occurred after the above changes to the government regulatory environment, although this does continue to remain variable (New Zealand Educational Institute: Te Riu Roa [NZEI], 2003; Williamson, 2005). A report published by NZEI (2003) supports this view and states “kindergartens and early childhood centres vary greatly in resources, professional development opportunities, commitment and knowledge in relation to ICTs” (p. 21). The report concluded by strongly recommending that the Ministry of Education begin to offer some guidance to the sector.

### *An ICT policy framework for ECE*

In 2005, the New Zealand Ministry of Education addressed the issue of guidance by working collaboratively with the ECE sector to develop a non-mandatory ICT framework. Gibbons (2006) argues that through instigating this framework the Ministry of Education assigned an extraordinary status to the role of ICT in ECE. While this may be the case, it is important to remember that it was in fact the sector that called for guidance in this area (NZEI, 2003).

In March 2004, a team was established within the Ministry of Education to liaise with the ECE sector and to formulate a policy document that would help to guide the appropriate use of ICT. A small team was formed in the Tertiary Curriculum Teaching and Learning Division (ECE) of the Ministry of Education, which also included an ECE secondment position. Alongside of this team an ECE sector reference group was established. This sector reference group was used as a guide during the consultation phase to ensure an appropriate approach was taken and all of the service types within ECE were represented. Of course, this approach can be seen as ECE being insular and not open to debate and discussion with the wider education sector.

ECE sector-wide consultation was carried out in late 2004. Nationwide meetings were held where the sector’s contribution was sought regarding the formation of the framework. Opportunities for this were made available during consultation meetings and through written feedback (survey). The resulting document (Ministry of

Education, 2005) was a collaborative effort of both the ECE sector and the Ministry of Education. Funding of sixteen million dollars was announced as part of the 2005 budget to support the implementation of *Foundations for Discovery*. This funding was targeted to the development of standards to assist ECE networks, to establish a strong web presence, to build professional capability, research and to support the development of an ICT infrastructure and e-administration (Mallard, 2005b). However, it was made clear that this funding was not available for centres to purchase ICT resources.

Within the ICT framework a much broader definition of ICT is identified than the traditional focus on computers. Information and communication technology is the term used to describe, “items of equipment (hardware) and computer programmes (software) that allows us to access, retrieve, store, organise, manipulate, share and present information electronically” (Ministry of Education, 2005, p. 4). Looking specifically at the New Zealand ECE sector, the term ICT could include computers, computer software, digital cameras, video camera, faxes, speakerphones, the Internet, dictaphones and many other electronic devices. Thus, this is the definition adopted for the purpose of this research, as stated in the introduction.

Evident within the framework are contradictions, which intentionally or unintentionally, influence the interpretation of the framework. A strong pedagogical rationale underpins *Foundations for Discovery*, which focuses on how ICT can be used to enhance the learning and teaching experience. This pedagogical rationale has been a major driver in pushing ICT into schools (Wellington, 2005). It has focused on what difference ICT makes to learning and how this is measurable and demonstrable. While an emphasis on pedagogy has been driving initiatives in the compulsory education system for more than two decades (Lankshear, Peters, & Knobel, 2000), it has only become more pronounced in ECE during recent times. Arguably, this increased focus on pedagogy is partly because of the recent drive to assess and document children’s learning using a socio-cultural approach. Many examples of

feedback received through the consultation phase are evident within the framework that highlights the use of ICT in this way. For example:

ICT is invaluable for sharing the documentation of children's learning with the child and their family. (Ministry of Education, 2005, p. 11)

It is naïve to think that ICT in ECE is driven by pedagogy alone, for example Brown and Murray (2006) examine the social rationale embedded within *Foundations for Discovery*. They challenge the imperative that drives this approach, which is to adequately prepare children for a world rich in technologies and through doing so benefit the child and contribute to the combined social and economic imperatives of the country. The economic imperative is clearly evident within the speech Trevor Mallard, the Minister of Education (2005a), delivered at the launch of the framework:

I'm pleased to launch a framework for ICT use in early childhood education ... It recognizes the importance of rapid increases in knowledge and technology as well as the realities of the world that our children are born into today. (Ministry of Education, 2005a, p. 2)

This societal rationale is also evident within the framework. As Brown and Murray (2006) point out, the view taken here is that ICT is already part of life and we should just accept it uncritically. This approach promotes the view that ICT sits separately to people and culture and assumes that the use of technology equates to progress and yet we know this not to be true it is a technologically deterministic view. However, a fallacy often arises when technology is discussed from this technological deterministic viewpoint. These discussions often assume technology is beneficent, and will provide us with a better future (Bromley, 1998). This view takes a myopic focus on the technology and fails to attribute the role of human agency.

Beynon (1992) maintains that:

Technological determinism diverts attention from such questions as the relationship of technology to human need. Implicit in technological determinism is that there is no choice about the technology we have. (p. 12)

This technological deterministic view is echoed by a number of quotes used in the framework from participants involved in the consultation phase:

It supports and facilitates children's future learning so they become accustomed to and more familiar with the tools of ICT. (Ministry of Education, 2005, p. 11)

Our children live in a world of ICT and need to be exposed and trained in its use, with safety and appropriateness in mind. ICT is such a great tool we should be using it to its full potential in all aspects of life and that includes teaching young children. (Ministry of Education, 2005, p. 19)

While this societal approach is being promoted within the framework, the Ministry of Education has chosen not to fund any ICT provisions. This is partly because of the non-compulsory nature of ECE and the diversity and complexity involved in funding community-based and private enterprises. This lack of funding has led to early childhood centres funding equipment themselves when they are financially able and seeking community grants and assistance. In itself this creates a division between those that physically have access to ICT and those that do not. This is often referred to as the "digital divide".

The concept of the digital divide (Warschauer, 2002) is a well known phenomena in education and society. It was a term coined in the mid 1990s to refer to where the physical availability of computers and connectivity are of concern, as it limits the learning experiences that can be offered (Irving, 1998). As the use of technology becomes more prevalent throughout society, concern has been expressed about reducing this "digital divide" between children who have ready access and those who have minimal or no access. Judge, Puckett, and Cabuk (2004) suggest digital equity or access to digital resources and knowledge is seen by many as a right and a necessary skill to develop in order to fully participate in the twenty-first century.

As previously stated, because of the complexity involved in equitably funding the diversity of ECE services and the higher emphasis being placed on self-governance, the government does not fund equipment or infrastructure. Brown and Murray (2006) point out that if there is no kind of intervention this approach creates winners and losers as some groups are clearly at a disadvantage. This point is further

evidenced in the study commissioned by the City of Manakau Education Trust (COMET) (Williamson, 2005) to identify what forms of ICT were being used in ECE settings, how they were being integrated, their impact on the sector and the teachers' current skill level in using these technologies in Manakau City, Auckland. Data gathering methods included the use of surveys and telephone interviews and the survey sample included all early childhood education providers in Manakau City. While the data gathered indicated that there had been an exponential growth in the use of ICT in ECE over the past decade, equitable access to equipment remained of concern. The report concluded by making a number of recommendations based on its findings.

These included (but are not limited to) increasing ICT resources to all ECE services and to particularly target Pasifika services as they were identified as being more seriously under resourced in terms of ICT than other providers. Williamson (2005) suggests that "this gap is likely to exacerbate already apparent community wide digital disadvantages amongst Pasifika" (p. 28).

The societal rationale reflects the belief that all learners should know about and be familiar with ICT as a preparation for active roles in society, and in becoming well-informed citizens. Poverty and socio-economic status can play a large part in underachievement and eventual disengagement from learning (Nelson, 2008). Therefore, if children attending ECE are going to have genuine equity of access to learning opportunities, the Ministry of Education as the funding body has a role to play in the provision of ICT that is fair and socially equitable (Brown & Murray, 2006).

The vocational rationale focuses on learning the skills and knowledge in the use of ICT to ensure success in continued education and the workplace. There is a strong connection here to the societal rationale: if the government is promoting this view of ICT in order to strengthen the economy, and to increase the country's world competitiveness, then it could be assumed that it has a responsibility to fund economic and vocational imperatives.

Of course, the role of ICT in preparing children for future employment is highly contentious as many believe that the purpose of education is much broader and relates more to life-long learning for active citizenship. Both of these views do, however, result in children learning skills and knowledge for their future. For as Toffler suggests:

All education springs from images of the future and all education creates images of the future. Thus all education, whether so intended or not, is a preparation for the future. (1974, as cited in Brown & Murray, 2006, p. 47)

A vocational imperative is implicit within the *Foundations for Discovery* (Ministry of Education, 2005). Mallard (2005a) has stressed the information age is upon us and this has been put forth as a convincing pretext in the supporting of ICT in ECE. Over time this rhetoric has been quite effective in convincing parents of the importance of their child developing these ICT skills and consequently working to fund the ICT equipment to ensure access. This line of argument has been convincing, as many parents view the development of these ICT skills as a prerequisite to gaining employment in an increasingly shrinking job market (Bromley, 1998).

In summary, this section has discussed the inception of the ICT framework, *Foundations for Discovery* (Ministry of Education, 2005). It has described the ECE sector's involvement in the formation of the framework to highlight the collaborative process that was undertaken. However, issues of wider engagement in this process have been identified, as have the underlying imperatives evident throughout this document. Through deeper analysis of *Foundations for Discovery* a number of competing and coexisting rationales are exposed that are NOT all about promoting learning.

### ***Early childhood curricula and ICT***

It has been strongly advocated that any ICT development within early childhood should be firmly grounded within existing knowledge of early childhood development and learning (Bolstad, 2004). ICT is likely to be influential in shaping young children's experiences and, therefore, it would seem timely to consider if and how ICT can fit within the ECE curriculum (Gibbons, 2006).

Parental involvement in ECE is also strongly advocated within *Te Whāriki* (Ministry of Education, 1996a) and supporting documents (Ministry of Education, 1996b, 1998, 2004) and there is widespread agreement that parental involvement in their child's education programme is beneficial to children's learning (Henry, 1996; Pascal, 1992). One form of involvement strongly advocated in the New Zealand ECE sector is that of partnership with parents. This partnership can take many forms including parent education, involvement in the ECE programme, through to a partnership approach (Braun, 1992). This partnership approach sees parents involved in making decisions and collaboration, which is viewed as a key component of this approach. Partnership at this level is about equality where power is divided equally; when this exists parents are drawn into decision making and policy issues (Stacey, 1991). This would mean that parents would be involved in the decision making about the use of ICT by their young children, purchasing of equipment and supporting the infrastructure involved. Teachers, on the other hand, would be providing parents with information about possible benefits and challenges of using ICT in ECE to ensure that decisions were made from an informed perspective.

As previously stated, the ECE curriculum is non-prescriptive and takes a holistic view where all dimensions of human development are interwoven. The early childhood curriculum takes up a "model of learning that weaves together intricate patterns of linked experiences and meaning rather than emphasising the acquisition of discrete skills" (Ministry of Education, 1996a, p. 41). *Te Whāriki* was written over 12 years ago and ICT was not prevalent or topical in New Zealand-based ECE services at that time; therefore, it is not surprising to see that no direct reference to ICT was made. The holistic approach advocated in the curriculum has resulted in a complex document and this has provided many challenges for the ECE sector to interpret as a guide for practice (Cullen, 2003). Arguably, the lack of explicit reference to ICT in *Te Whāriki* has resulted in teachers choosing (consciously or not) to ignore the opportunities that new technology might afford the children in their services. Conversely, it could also be said that because of the integrated view of learning advocated in the curriculum, alignment to the ICT framework is self evident, although this would only ever be a retro fit.

As previous sections also demonstrate there are a number of theoretical frames that underpin *Te Whāriki* (Ministry of Education, 1996a). These competing and coexisting theories of learning may also influence the way in which teachers choose to use ICT within their programme of learning. For example, Roskill South Kindergarten COI 2003-2006 focused strongly on the socio-cultural theory within *Te Whāriki* when using ICT in their research and linked this focus across ICT, a community of learning and assessment (see Ramsey, Breen, Strum, Lee, & Carr, 2006). In the final research report it was claimed that the national ICT framework, *Foundations for Discovery* (Ministry of Education, 2005) acknowledges and affirms the place of ICTs within the implementation of *Te Whāriki* (Ramsey et al., 2006). These authors suggest that *Te Whāriki* is the front frame, and ICT finds its place as:

[a] useful resource for children and teachers who are developing working theories and dispositions for life long learning: belonging, wellbeing, exploration, communication and collaboration. (p. 2)

The central purpose of the use of ICT in New Zealand ECE services is to support children's purpose and interests (Ramsey et al., 2006). Using *Te Whāriki* (Ministry of Education, 1996a) as the front frame an alignment to the use of ICT can be explored. Table 2.1 outlines examples of how ICT can be aligned with the principles of *Te Whāriki* (Ministry of Education, 1996a).

Table 2.1

*Exploring the alignment of ICT and the principles in Te Whāriki*

Principles	Examples
Empowerment	Children using ICT to take responsibility for their own learning e.g., documenting points of significance
Holistic Development	ICT is linked to children's purpose and interest to support and extend learning
Family and Community	Used to enhance the communications that occur between environments
Relationships	Using ICT to foster reciprocal relationships with the wider world

(Adapted from Flavell, L., 2006)

Although tensions appear under the surface of *Te Whāriki* there is no doubt that the use of ICT in ECE can be shown to align with this document and can be used to frame its thoughtful and integrated use across the curriculum. However, as previously stated, *Te Whāriki* is now more than a decade old and in light of growing critique, it may be timely for it to be reviewed and to highlight the place of ICT more specifically in the education of young children based on research evidence (Flavell, L., 2006).

### ***Critique of the recent research***

Bolstad (2004) published an extensive literature review that drew together a range of research that explored children's and adult's use of ICT in early childhood education, pedagogy, teacher education, professional development, sector capability, administration and infrastructure. As a contracted review for the Ministry of Education, there is a positive tone to the study and it is strongly influenced by assessment of children's learning. It is noteworthy that Bolstad cited very few of the studies cited earlier in this chapter opposing the use of ICT in ECE.

In short, the review provides a highly descriptive account of the literature rather than in-depth critique. As someone involved with this project at the time, this criticism is valid as the intention was to shape and justify the use of ICT in ECE. In hindsight it is clear that while Bolstad (2004) acknowledges the existence of a debate about whether to use ICT with young children however, many of the counter arguments were not discussed for reasons that remain unknown. The use of new technologies in educational contexts has often been associated with moral panic (Wartella & Jennings, 2000). While Bolstad's (2004) review of the ICT literature has to some extent addressed issues of physical, social, emotional and cognitive development, gaps remain evident with regard to the aforementioned drivers that underpin the use of ICT in educational contexts. Media has fuelled public perception that ICT is progress and all progress is good; consequently ICT needs to be part of our education system. A strong societal rationale and technologically deterministic undertone is evident throughout this review. At no point does Bolstad (2004) engage in discussion about the other competing underlying imperatives driving the use of ICT in educational settings.

Notably also missing from the review is discussion around the work of prominent authors such as Jane Healy, Alison Armstrong and Charles Casement. Healy's research (1990) explores how the child's brain is physically shaped through exposure to popular culture and what effect this has on their long-term education. Healy takes a cautious view of technology in education and raises questions about the cost of sustaining the use of ICT and asks would it make any difference if ICT was not offered in educational contexts? Armstrong and Casement's book (2000) draws on hundreds of international studies and first-hand observations to address questions such as are computers effective learning tools for young children and can computers help children to learn to read, write and think? They suggest that technology can enhance learning but for this to occur the education setting must be well funded and supported. This is not a view evident in the Ministry of Education (Bolstad, 2004) funded review. No discussion or reference to this work was made in the Ministry of Education review; perhaps the reason for this could have been the authors' view of the infrastructure required for successful implementation. They explain, "the reality is that technology requires trade offs – trade offs that are never in the best interest of children" (Armstrong & Casement, 2000, p. 196). One can only speculate that this was not be one that would have found favour with the Ministry of Education particularly as there was no intention to fund ICT equipment.

A large section of Bolstad's (2004) review focuses on professional development. It is strongly advocated that professional development would assist teachers in integrating ICT within the programme of learning reflective of their guiding philosophy. Professional development was also seen as an opportunity for teachers to engage in discussion and debate about the place of ICT in the programme and to learn and explore new ways of working. While the review has been written for the early childhood sector, characteristics of effective professional development remain the same. Therefore, conspicuous by its absence was any reference made to the compulsory sector's ICT professional development programmes (Ham et al., 2002; Ministry of Education, 2006) that have been operational for nearly a decade. This gap between sector initiatives is further evidence of ECE being closed to wider thinking about the role of ICT in the education sector.

The central importance of teachers' pedagogy to the effective and integrated use of ICT has remained a strong theme throughout the literature. Patterson's (2004) research reveals some strategies that can be used to assist in the successful integration of ICT into ECE. A case study was undertaken in an Auckland early childhood centre over a period of five consecutive days with 64 children, mostly aged between three and five years, and six teaching staff (Patterson, 2004).

Participants worked through Patterson's "Starfish Model" for integrating ICT into learning. The "Starfish Model" is an information literacy approach developed specifically for early childhood teachers. This model uses a co-constructivist approach that integrates ICT into children's learning in a "natural" and meaningful way. The model is based on building on a child's prior knowledge. For example, a child having visited the beach has collected a starfish and has brought it into the centre to share at group time. Teachers, through using the "Starfish Model," establish what knowledge the child already has of starfish and progresses through the stages of enquiry with them. Various forms of ICT are identified at this stage that could be used to support the process. Data collection techniques included classroom observations of teachers and children, interviews with teachers, observations of interactions between teachers and children and recording the hardware and software that was used throughout the duration of the study.

The results indicate that the most common piece of ICT equipment used by children was the computer and related software. Results also showed that children who worked independently at the computer often selected software that was more directive in nature. However, when working alongside an adult, children often chose more interactive and information type programmes. An interesting point to note is that most interactions at the computer involved a behaviourist approach to teaching and learning, that is, a response to some type of stimulus. This stimulus can be teacher directed or, as Patterson (2004) shows, "computer controlled learning" (p. 28). In this study, computer controlled learning was particularly evident when children worked alone at the computer using software that drove the learning process rather than the child being in control. The value of this finding is that it reminds us that the mere

presence of ICT does not change pedagogy and may even reinforce traditional ways of teaching. If meaningful learning is to occur we are again reminded of the importance of providing a balance of access to ICT and mediation by others to support and guide learning.

Other frequently used ICTs included the audiotape and video recorder, the video player, the digital camera and the phone and fax. Many of these pieces of technology were used to record events that were especially relevant to the children in the centre. During interviews teachers expressed the view that they need to feel competent in using ICT themselves before working with the children. A variety of beliefs were expressed by teachers about the learning associated with ICT use, and during discussions it became clear to the researcher that teachers in fact were “unsure and tentative about what children were learning when using information communication technologies” (Patterson, 2004, p. 29).

Laffey (2003) found similar findings in a three-year study undertaken in an American College of Education which investigated how pre-service teachers became socialised to the role of teaching and how they developed as ICT using teachers in a technology-rich teacher education programme. Data collection techniques included survey data from all students in the programme, intensive case studies with two early childhood pre-service teachers with data from freshman and senior years, a focus group and interview data with a cohort of pre-service teachers. The findings suggest that the pathway to appropriation of technology as a teacher is not linear but consists of a variety of factors. These include the importance of faculty integrating the technology through the teaching programme, role modelling both by faculty and observed professional practice, basic ICT skills being developed alongside of the teaching qualification and to frame “teaching the technology in a way to mediate the expressions, performances, and activities that we value in children” (Laffey, 2003, p. 378).

Importantly, this research also revealed that a strong view exists in all areas of the education sector that ICT is nice to have in the classroom or playroom, but many teachers would still prefer to spend money on other equipment to aid learning. This view suggests that teachers are not (yet) convinced of the value and ICT may not be

perceived as beneficial to children as books. In challenging this perception, Yelland (2005) points out this belief “privileges old technologies but does not provide a rationale to support the assertions made” (p. 225).

The key issue for New Zealand early childhood teachers is that we do not know what teachers think as there is little or no research to document teachers’ concerns. It may be that ICT is still often considered supplementary to an education environment. An interesting point to note here is that early childhood teachers talk about valuing skills such as creativity, flexibility and building interpersonal skills among children and yet, to date they have not made a link between these skills and the use of ICT (Laffey, 2003). Again, we do not know if this claim is true of New Zealand early childhood teachers because of the gap in the research.

A line of research is, nevertheless, beginning to emerge which is allowing children’s voices to be heard. For example, Stephen and Plowman (2007) investigated how teachers can enhance three and four-year-old children’s encounters with technology. Three interacting components were investigated: the child, the technology (using a broad definition of ICT), and the teacher. Children in this research were viewed as active agents of their own learning with individual preferences for particular learning experiences. The participants (14) were drawn from eight preschools in Scotland and all were committed to the same national curriculum. The children were aged between three and five years and were in their first or second year of pre-school. Guided enquiry was the approach used to investigate the interaction that occurred between children’s encounters with ICT. This was done in order to ensure that the findings were rooted in authentic experiences and to avoid a deficit approach to the research.

Four cluster group meetings were held with the participants where video taken in the centre was used as a stimulus for discussion. Teachers shared the challenges that they experienced with ICT and talked about the ideas posed. Teachers were then asked to plan two interventions to be undertaken in their own settings that would address difficulties they were experiencing with ICT and explore new activities. One of these interventions would not include a computer. Upon return to their centres participants put their plan into action and gathered data about these interventions to share at the next cluster meeting. The research team visited each centre seven times to collect

evidence directly. Individual interviews were conducted with the participants before and after any intervention and a survey was undertaken of the perceived level of ICT competence of the entire centre staff before and after the process of guided enquiry.

Children were interviewed on an opportunistic basis about their use of ICT in the centre. Two types of structured observations - scans and observations of targeted children supplemented the video recording. Emerging findings were presented back to the cluster meeting where there was opportunity to discuss and debate them. Findings show that teachers' pedagogical knowledge was strengthened as a result of having the opportunity to learn with and from others and through reflection (video). Teachers developed skills and confidence in the use of ICT and this supported them in providing authentic-learning experiences for children. An unexpected outcome was the way in which children's engagement with ICT contributed to positive learning dispositions. As teachers became more confident in the use of ICT and innovative in their approach, children's experiences became more varied, sustained and productive.

The importance of teachers understanding their role is underscored through this research. Current theoretical approaches to ECE highlight the teacher as a provider of resources and a facilitator of the play area. According to Stephen and Plowman (2007, p. 17) teachers "underplay the value of their direct interaction with children" as it is perceived to be overly didactic. Teachers rarely intervened or offered guidance, which fits with a Piagetian concept of a child-led approach. However, the findings do not suggest a shift to a didactic approach but to interactions that are sensitive to the context and the individual needs. Above all, it is clear that teachers play a vital role in enhancing children's encounters with ICT.

In the New Zealand ECE context teachers have also been encouraged to rethink and re-evaluate their own pedagogical practices due to the release of *Te Whāriki* (Ministry of Education, 1996a). The curriculum helps to place the learning experiences of children in a broader social and cultural context. It also defines a more active role for the teacher, which is to work alongside the child supporting and extending their learning. The major difference between these learning theories was that the teacher led instead of following children's development. Farquhar (1995) argued that despite

the research evidence and critiques that have occurred of traditional Piagetian views of child development and the implications for teaching practice, early childhood teachers have been slow to revise their beliefs about theories of how children learn and slow to change their practice. Evidence of this can be found in McLachlan-Smith's (1996) doctoral research where the findings indicate that teachers in New Zealand kindergartens continued to use maturational models of child development. Research also shows that only 50% of ECE teachers use *Te Whāriki* for promoting literacy (Ministry of Education, 1996a) and most teachers continue to have maturational models of child development at the foreground (McLachlan, Carvalho, Kumar, & de Lautour, 2006). Teachers being slow to revise their practice could also be said about the use of ICT in early childhood despite the research that is beginning to emerge about its potential value to teaching and learning (O'Rourke & Harrison, 2004; Siraj-Blatchford, & Siraj-Blatchford, J. 2003; Stephen & Plowman, 2007).

As noted earlier in this review, a consistent message evident in historic and more recent literature is that it is not the ICT itself that provides the quality learning experiences, it is still the teacher. Ironically, this issue, which remains pertinent, was identified over 25 years ago when Papert (1980b) talked of the importance of the teacher "supporting the child as they build their own intellectual structures with materials drawn from the surrounding culture" (p. 32).

In summary, this section has reviewed recent ICT literature relating to the second wave of ICT in ECE. It highlights pockets of the early childhood teaching community, both nationally and internationally, that are beginning to explore ways in which they can integrate the use of ICT in the education programme. From this review it is evident that such integration is a complex task and requires much more than merely learning how to use the technology. The remaining sections of this literature review examine some of the issues raised in greater depth from different stakeholder perspectives.

### *Stakeholders' viewpoints of ICT*

The following section reviews a selection of the literature on teachers', parents' and children's views regarding the role of ICT.

#### *What do teachers have to say?*

ICT is a recent addition to many early childhood services. The evidence of the contribution that ICT has made to the curriculum and to children's learning is still unclear (Stephen & Plowman, 2002). Studies (Cox et al., 1999; Davis, Bagozzi, & Warshaw, 1989) have shown that if teachers can see evidence of the benefits of using ICT in their educational setting then they are more likely to have a positive attitude to its integration. In one of the first New Zealand studies Podmore and Craig (1989) examined young children's social interactions and teachers' and parents' perceptions before and after the introduction of a computer into an ECE setting. Two junior primary and two kindergarten classes participated in this study and pre and post-computer data gathering methods included observations and interviews of the children and teachers' diaries. The findings from the study specifically with regard to teachers' perceptions during the pre-computer phase indicated their workload increased as they participated in computing courses and selected appropriate software. During the post-computer phase teachers commented that the major problems associated with computer use for them included having adequate time, transporting the computer (setting up and putting away), security and managing children's turn taking (Podmore & Craig, 1989). Arguably many of these issues have diminished as ICT has become more readily available in ECE settings. Of note is the diary entry a teacher made after two terms of computer use:

We had lots of worries and concerns at the beginning. These have not come to be. The study in my view has proved that it is the adults who are afraid of the technology and the children just accept it as part and parcel of the programme... (Podmore & Craig, 1989, p. 39)

This point is still relevant today in the ECE sector. When teachers were asked by Podmore and Craig to comment on the advantages and disadvantages of computers in ECE settings, benefits were described as "interest" in the kindergarten setting and

“learning” in the school environment. Disadvantages by kindergarten teachers were identified as lack of suitable “software” and “cost” of the hardware and software. When asked about the disadvantages of computer use one kindergarten teacher stated:

No disadvantages but ‘... there’s nothing that stands out about it, if you had to balance out the expense of the computer against what it was going to provide then I’m afraid at this stage kindergarten teachers would probably opt for having new tables and other things that they could see they would get more use out of. Particularly with the quality of the software’. (Podmore & Craig, 1989, p. 41)

A decade later in the United Kingdom Cox et al., (1999) set out to investigate the factors which had contributed to the continuing use of ICT by teachers experienced with the technology. The research focused on how teachers perceive ICT contributes to teaching and learning, and whether this is in conflict with their pedagogical and epistemological beliefs. Data collection methods included questionnaires (n=135), and teachers’ reports and interviews (n=20). The findings show that if “teachers perceive ICT to be useful to them in their teaching and their pupils’ learning, then they are more likely to have a positive attitude to the use of ICT in the classroom” (Cox et al., 1999 p. 5). Perceived usefulness would include making lessons more interesting, more diverse, improved presentation of teaching materials, streamlined administration, enhanced career prospects and fun (Cox et al., 1999).

A few years earlier Brown and Dougherty (1994) conducted a New Zealand study to investigate teachers’ perceptions regarding the potential benefits and challenges of using computers in the ECE environment. The study employed two main methods of data collection; initially all chartered ECE in a provincial New Zealand city were surveyed to identify if and how computers were being used and from this information a purposive sample of teachers in four kindergartens and four education and care centres were interviewed. These teachers were selected because of their “perceived level of familiarity and experience with computers” (Brown & Dougherty, 1994, p. 19). Notably, the surveys identified that no computers were actually being used in the ECE settings. The study highlighted a number of interesting points which included the low priority given to using computers in the teaching of young children, the cost

involved in purchasing computers, and the importance of professional development to provide support and guidance in the meaningful use of computers with young children.

In an English primary school, Loveless (2003) conducted a case study to investigate the interactions between teachers' perceptions of ICT and their pedagogy. The study drew on ethnographic techniques; which included interviews and observation of classroom practice, narrative descriptions and the use of written material such as school documentation. Conducted over eighteen months (1999-2000) the study involved 12 teachers of children aged seven to eleven years of age. Although located in a school setting, the study presents a relevant analysis of teachers' perceptions, which were reflected in the construction of professional knowledge as a subject.

Results show that teachers' perceptions of ICT ranged widely and at times were ambiguous. While recognising the positive and negative impact new technology has on society, many viewed ICT as an important skill that children needed to master in order to function fully as citizens, which shows evidence of a societal rationale. It is interesting to note that even after more than 30 years of government strategies in the use of ICT, teachers characterised it as a new learning area. Conversely, no teachers were able to describe how ICT might be used to support children's learning; they did, however, prioritise the learning of skills and techniques in using ICT. These findings are similar to Patterson's (2004) study indicating that teachers' ICT pedagogy across the education sector was still developing.

While articulating excitement and opportunity for the use of ICT, teachers also expressed growing concern about having to "keep up with the cultural phenomena of irrevocability and rapid change" (Loveless, 2003, p. 318). Flexible access to ICT was regarded as important in changing teachers' attitudes and use of the technology; this was often related to home use. Teachers advocated that the school played a vital role in ensuring equity of access to ICT for all children. In a similar vein to research conducted in ECE settings many teachers did, however, express apprehension of the extra demands placed upon them to remain cognisant of the changes in technology. They also expressed concern over their ability to provide a curriculum that would

equip children with the knowledge and skill required for the future. Many teachers also indicated that they felt ICT required specialist knowledge. Loveless (2003) points out perceptions of ICT as 'subject', 'tools' or 'capability' are not clearly distinguished by teachers. Teachers acknowledged that while it was easier to teach ICT as a discrete subject, the benefits came when an integrated approach was adopted. Loveless (2003) concluded that professional development models needed to recognise how teachers' perceptions of the purpose and potential of ICT are grounded in a socio-cultural context. This conclusion has direct relevance to the ECE context.

Having physical access to hardware and software is imperative in supporting the integrated use of ICT in the ECE curriculum. Williamson (2005) conducted research in New Zealand on teachers' use, perceptions and barriers to using ICT. A survey was the method used to gather data from all ECE services (n=214) in one geographical location. The sample was stratified into two groups. These included Māori and Pasifika centres (group one) all other ECE services in the area including home based services (group two). Group one was administered their survey by phone because of cultural considerations and group two was sent a postal questionnaire.

Eighty-nine surveys were returned with the highest response rate coming from group one. An aspect of Williamson's (2005) research explored what forms of ICT were being used in ECE and the findings indicated that early childhood centres were most likely to be using a computer and telephones (98%) while video cameras were used by 29% and 28% had DVD players. Digital cameras were used significantly more (71%) and the centres that indicated they used digital cameras had computers. Computer management systems were used by 59% and 65% of respondents indicated that ICT was used in children's learning (Williamson, 2005, p. 8). These data indicate an exponential growth in the use of ICT in early childhood environments over the past decade. Although access to this equipment has grown, many of the issues remain the same as they did for teachers in Brown and Dougherty's (1994) study. The top five issues identified in the report included there being insufficient funds to purchase equipment (58%), teachers having insufficient knowledge about computers (53%), limited confidence in using such equipment (45%), and a lack of suitable software (40%) and hardware (39%) (Williamson, 2005).

Confidence in using ICT devices and a knowledge of how to integrate them in a pedagogically appropriate manner has been identified as a concern in many studies (Cox et al., 1999; Hall & Higgins, 2002; Judge et al., 2004). A major challenge of the New Zealand education sector, as well as globally, is the need to provide opportunities for teachers to develop the confidence and competence to integrate the use of ICT in authentic and meaningful ways. O'Rourke and Harrison (2004, p. 12) support this view and state "the majority of early childhood educators do not have adequate knowledge of how the technology can be used to best aid children's learning." In the past ICT professional development has been offered that focuses on the technical aspects with little direction offered regarding the pedagogical approach that could be taken (Cox et al., 1999).

Wild (1996) makes the argument that:

Too often the assumption is made that student teachers and teachers need to know how to use computer technology without first asking why they need to know and importantly, what they need to know: computers are too often presented as an imperative. (p. 3)

While teachers do need to have the confidence and competence to operate successfully in ECE environments that are ICT rich, they also need to think critically about why and how they are using these technologies to support children's learning. Stratford and Brown (2002, p. 8) concur with this argument and stress "if we want to improve the quality of education in New Zealand then pedagogy is of central importance."

In summary, for nearly two decades teachers have been voicing concerns regarding the resourcing of ICT hardware and software and the lack of infrastructure to support the use of ICT in ECE settings. They have identified a variety of factors that affect their approach to the use of ICT by themselves and young children. For example, teachers lacking in confidence and competence in the use of the technology and, as an outcome, increased workloads. Teachers also indicated that they did not have a clear understanding of how they can incorporate ICT into the curriculum to enhance children's learning. These issues all influence teachers' perceptions of the use of ICT and their prevailing attitude. It is only when teachers begin to see the possible value

of ICT use in their teaching and children's learning that their attitude is likely to change. A strong message that resonates in these studies is that professional development models need to recognise how teachers' perceptions of the purpose and potential of ICT are grounded in a socio-cultural context. The next section explores parents' perceptions of the use of ICT by their young children.

#### *What do parents have to say?*

As established in the introduction a diversity of early childhood services have been established in New Zealand to meet the needs of a changing society (May, 2002). Many teacher-led services do have a high degree of parent input, particularly in the management of the service and in the resources purchased. Therefore, it is imperative that parents' perceptions of the use of ICT with their young children are considered in this study.

Research on parents' perceptions is very limited. Podmore and Craig (1989) were some of the first to examine parents' perceptions. In their kindergarten sample they found that 36% of parents were strongly positive and 46% were positive or in favour of computer use. In total, 5% only of the parents gave unfavourable responses to this new phenomenon. Overall, this study revealed a positive response to having computers in the kindergarten. The study also asked parents how they felt about home ownership of computers. In response, many parents indicated that having a computer in the home or educational environment was positive 65%, a lesser number of parents (25%) indicated that they were neutral or had certain reservations around computer use by children. A further 10% of parents indicated a negative view of having a computer in the home or the education setting.

In another New Zealand study focusing on computers in education, Ham (1990) surveyed 1055 Christchurch parents of children attending primary and intermediate classrooms. It sought to find out what parents actually thought about computers use with their children in the compulsory sector. More to the point, it attempted to find out what parents thought about how they were being used and their perceived value. As Ham pointed out, parents have every right to be asking such questions as they were the very people who were funding this equipment in schools. He stressed that in

New Zealand classrooms computers have been labelled “cake-stall computers” because parents have been centrally involved in raising money to fund their purchase (Ham, 1990, p. 53). Ham’s study found that although parents had helped fund the introduction of a large number of computers into schools and believed that having a computer in the primary classroom was a good thing, in fact, they were unclear about the precise value of them to their child’s education. Indeed, many parents saw the use of computers as something of a mystery. Ham identified this as a challenge to educationalists, calling upon them to assist parents in their developing understanding of this new technology and the place it might have in education. It is unclear if this problem continues to exist two decades later.

In early childhood education, parents also share the belief that latest technological knowledge is important for their children. A strong societal rationale is evident in the perception that children need to be exposed in order to develop the skills required for the twenty-first century. As a result of this belief, Sheridan and Pramling Samuelsson (2003) claim that extra financial pressure is being placed on these services to provide access to hardware and software in their educational programme. In community-based ECE settings parents are also being asked to contribute to ICT initiatives through donations and fundraising, which underscores the importance of further research focusing on what parents think about the use of ICT in ECE and any perceived value.

In Australia, Downes (1999) investigated parents’ perceptions of computer use in the home setting. This study spanned three years. It drew on a cultural studies theoretical approach in which the computer was viewed as a cultural artefact. As computer use occurred in the family setting (with its own social, historical and cultural context), the prevailing discourse between the parents and the child helped shape the child’s interactions with the computer. Discourse in this study is taken to mean the ways that the community constructs and shares information about what they believe and the systems around this.

Data were collected using a multi-method, multi-staged approach. Stage one involved a group discussion with 190 five to 12 year-olds, stage two involved structured interviews with 250 eight to 12 year-olds and in stage three in-depth interviews with

13 of these children and their families and teachers were conducted. The analysis of the parents' discourses drew on information from stage data about the importance of computers. Results show that the most prominent discourse focused around the importance of mastering computers to prepare for future employment; that is, the vocational rationale. A strong view was also evident that children should learn about computers at school in partnership with the home. A number of parents indicated that they thought it advantageous for their child to have access to a computer in the home setting.

Parents talked of the computer being a tool and identified specific applications that assisted their child's learning; for example, word processing, although parents stressed the importance of handwriting skills. In most studies the symbolic function of the computer as both a toy and tool was evident. However, 'house' rules emerged around this construct with priority always being given to those using the computer as a tool. The concept of the computer as a tool was linked to computers for the future and the importance of the school working in partnership with the home. Downes (1999) suggests parents taking this approach did not view computer literacy in the same way they might view more traditional subjects such as numeracy and literacy. The findings indicate, "only the traditional skills and technologies are seen as essential at school, while the newer literacies are seen only as advantageous" (p. 110). Therefore, they are not truly embedded in the culture of education.

From an extensive analysis of the literature this section summarises the findings of three noteworthy studies that offer insight into parents' perceptions of ICT by young children. Research relating to parental perceptions of ICT is sparse, particularly relating to children younger than five years of age. The research available generally shows that parents have a positive attitude to children using computers, especially if they are used to aid learning and provide essential skills for future success. However, as Ham (1990) identified, the precise value that parents think the computer adds remains unclear. Parents indicated that they place a high priority on children learning traditional skills and while computers were advantageous in education they were not viewed as essential. This leads to the question of whether computers remain something of a mystery and, as Ham (1990) questioned, do parents continue to have

an unclear understanding of how ICT has the potential to enhance learning? Within the literature there is also evidence of both the societal and vocational rationales influencing the perceived benefits and the subsequent use of ICT in ECE settings.

*What do children have to say?*

An important gap in the research literature is children's perspectives about their experiences (James & Prout, 1997). This has led to an incomplete understanding of children's experiences with ICT both in the home and the ECE setting. Through developing an insight and understanding of children's perceptions we can learn a great deal.

In Podmore and Craig's (1989) study, 14 children were observed across two kindergartens and children were selected according to birth dates recorded on the rolls (e.g., closest to 31 March, 1986). During pre and post-computer use many children perceived the computer as being a fun activity. When children were asked to describe their likes or dislikes regarding computers, many named or described software. Others specified "software related activities like graphics, music, playing or working and a few mentioned technical or manipulative details like using the joystick" (Podmore & Craig, 1989, p. 15). Only one child expressed a negative view of computer use during the study. When children were probed further regarding their likes and dislikes a number named specific software programmes or motivational aspects, such as "I like the teacher helping me" (Podmore & Craig, 1989, p. 15). They tended to focus on social interactive or motivational details such as being pushed or having software that posed too much of a challenge. Children who had computers in their home were asked to comment on what they liked doing on these home computers and again most named specific software or software related activities.

In Australia, Burgess and Trinidad's (1992) research explored what knowledge and understandings children have of computers at five years of age and whether they have positive or negative views towards their use. Ninety four children in three metropolitan primary centres were interviewed using a "drawing and focused interview" technique (Kutnik, 1978). This method involved asking children to draw a

picture of a computer at the initial stage of the interview and then the interviewer asked appropriate content questions about the drawing to determine their awareness, understanding and experience towards the use of computers. Children were asked to name the parts of the computer, provide a description of how the computer worked and to offer an explanation of what computers actually did. The findings from this study indicate that the majority of children viewed the computer as an entertainment machine. A small percentage (12%) suggested an alternative use for the computer (e.g., word processing) and only 8% discussed computer use in relation to their parents' employment. The study concludes by stressing the importance for teachers to find out about the perceptions that children hold with regards to computers. This is important to develop a baseline and Burgess and Trinidad (1992) suggest that the drawing interview technique is an appropriate tool to do so.

This section has shown that the handful of studies reported here demonstrate that children by four years of age have already formed their own perception of computer use. Teachers are also urged to find out about children's perceptions to inform how they may offer ICT in educational setting. Because ICT in ECE is a more recent phenomenon, further research in this area may prove beneficial in helping to understand their role in children's learning.

### ***Teacher beliefs and self efficacy***

In ECE the teachers ultimately decide if and how ICT will be offered as part of the educational programme. As has already been established, this is directly influenced by their perception of how ICT can support or hinder their own and children's learning. Research on teachers' beliefs has demonstrated that they have an important impact on practice. In any learning experience, the individual brings personal belief, which either shows congruence with the new information being learnt or conflict which can impede the individual's learning (Kagan, 1992). Teacher beliefs can act as a 'contextual filter' through which teachers screen the experiences they have in the ECE setting, interpret them, and adapt their teaching practices to (Clark & Peterson, 1986). The idea that teachers' beliefs act as a screen is not new. As reported previously, Sandberg and Pramling Samuelsson (2003) noted that teachers' beliefs

about appropriate early childhood programmes are strongly influenced by their own childhood experiences and these beliefs function as a filter through which subsequent educational experiences are offered.

Arguably, Riel and Becker (2000) have undertaken one of the most comprehensive studies revealing the importance of teachers' beliefs in the computer environment. They examined how pedagogical beliefs, practices and computer use of teacher leaders compared to other teachers. The data used in this study were drawn from a large national 1998 survey on Teaching, Learning and Computing. From a national probability sample eight hundred and ninety eight American schools were stratified by school level (elementary, middle, high school). The study included a sample of 718 schools selected because of their high level of access to computer technology or the teachers had previously participated in professional development opportunities. The findings show that there is a strong correlation between the use of computers and a teacher's pedagogical orientation. Results show that teachers who adopted a constructivist approach to their teaching were much more likely to have students use computers. In contrast teachers who took more of a traditional role in classroom delivery, which emphasised transmission of information, were less likely to engage their students in the use of computers. Riel and Becker (2000) conclude that the more opportunities teachers have to engage and collaborate with other professionals, the greater the likelihood that these teachers will use a constructivist approach in their learning programmes. While the research was undertaken in the compulsory schooling sector outside of New Zealand, there are important implications for studying teachers' beliefs in ECE.

Teachers are often unaware of personal beliefs and are not always able to articulate these and how they might shape their teaching practice, and, therefore, may be reluctant to examine them in a public forum (Kagan, 1992). Spodek (1988) points out that implicit theories are not easily modified by "the results of research or by new educational or developmental theories" (p. 167). Kagan (1992) agrees with this view and suggests that the biggest influence is that of other teachers' professional practice and the culture of the teaching environment. Beliefs often remain unchanged unless challenged and then they will only change if the new information can be assimilated into existing ideas.

Pajares (1992) argues that the beliefs teachers hold influence their perceptions and judgments, which, in turn, affects their teaching behaviour. It is also important to consider self-efficacy beliefs, with regards to the use of ICT by teachers. Pajares (2005) suggests that the beliefs that are held by individuals about their capability to succeed are vital forces in their endeavours in the success or failures they experience. Pajares (2005) stresses “these self-efficacy beliefs provide the foundation for motivation, well-being, and personal accomplishments in all areas of life” (p. 339). Self-efficacy is a major determinant in the choices people make in life and the activities they choose to engage in and feel competent in.

The attitude teachers have to the use of ICT and ICT self-efficacy are important factors in assisting teachers in the integration of this technology into the programme of learning. This attitude is affected by the challenges that they may have experienced with ICT and can affect beliefs about future performance (Olivier & Shapiro, 1993). If minimal support is available for the infrastructure of ICT in ECE (Williamson, 2005) and traditional professional development approaches have focused on the mechanics of ICT use (Cox et al., 1999) then teachers may not perceive ICT to be of benefit. Such perceptions of how they will achieve in future episodes affects both the initiation of such tasks and persistence (Bandura, 1977). A person with high self-efficacy is more likely to persist and complete the task because of this.

There is minimal information available about how a teacher’s pedagogy evolves throughout the course of their teaching career and their use of ICT and Ertmer (2005) has identified this as a crucial gap in the research literature. A closer examination of the link between the integration of ICT into the early childhood programme and teachers’ beliefs and attitudes may help us to develop our understanding of why some people successfully use ICT in their educational programmes, and why some do not.

In summary, this section has discussed teacher beliefs and concepts of self-efficacy and links drawn to the use of ICT in ECE. The review of literature highlights that self-efficacy does play a major role in the choices that teachers make regarding both the curriculum and pedagogy of ICT. The next section will explore what an enabled and

enacted ICT curriculum in ECE might resemble and provide some guidance in the form of principles that should underpin this curriculum.

### *ICT enabled and enacted curriculum in ECE*

Our image of children no longer considers them as isolated and egocentric, does not see them as only engaged with actions with objects, does not emphasize only the cognitive aspects, does not belittle feelings or what is not logical and does not consider with ambiguity the role of the affective domain. Instead our image of the child is rich in potential, strong, powerful, competent, and most of all connected to adults and other children. (Malaguzzi, 1993, p. 10)

This section explores what an ICT curriculum in ECE might resemble when drawing on the literature reviewed in the first and second waves of ICT and the theoretical approaches discussed in previous sections of this review. Stakeholder perspectives are acknowledged and a synthesis of core principles that could support an enabled and enacted ICT curriculum in ECE is suggested. This section concludes by stating the research problem and research objectives.

Debates about the use of ICT in the educational context and its use by young children have fuelled a moral panic for nearly three decades. The research itself is inconclusive as a variety of conflicting views are presented. It would not be surprising to find many teachers still remain confused about any potential value of using ICT in their education programmes because of conflicting opinions and disagreements occurring between professionals such as psychologists, cognitive scientists, philosophers and technologists (Oldridge, 2007).

The Ministry of Education released the ICT framework to the ECE sector (Ministry of Education, 2005) to offer some guidance in the integrated use of ICT and within this document strongly advocated a pedagogical rationale. While this is admirable, upon closer examination it is clear that a strong vocational, societal and to some extent economic rationale is strongly evident within the framework, which influences the way in which ICT is mediated by teachers and enacted within the curriculum.

The early childhood curriculum (Ministry of Education, 1996a), while advocating a holistic approach to learning has been critiqued for the limited guidance it offers to teachers (Hedges, 2002). This document is now more than 12 years old and, as stated, ICT was not prevalent or topical at the time of its writing: therefore no direct reference was made to ICT. When implementing *Te Whāriki*, teachers attempt to use an approach that meets the needs and interests of their community of learners; and therefore, this lack of guidance with regards to ICT has arguably resulted in teachers choosing (consciously or not) to ignore the opportunities that ICT might afford the children in their services. Previous sections of this review have demonstrated that because of the holistic approach evident in the curriculum a strong alignment can be drawn to the ICT framework. However, until this document undergoes a major review it is clear the link to ICT will only ever be a retro fit.

Without being technologically deterministic, ICT has fundamentally changed the way we communicate, compose texts and access information. In the backdrop of these changes the concept of multiliteracies has emerged as a term which encompasses the changing view of literacy evident in the twenty-first century. Most children appear to be eager users of ICT and it is important that educational settings foster the multimodal ways in which literacy can be taught. What is imperative is that teachers further their knowledge of the broader sociological issues relating to literacy and through doing so develop an understanding of how literacy is linked to social, political and cultural conditions, thus becoming more able to develop educated and well rounded citizens capable of contributing to the goal of a fairer, equitable and socially just society.

This literature review has discussed constructivist, social-constructivist and critical theory approaches to learning. The constructivist view of learning emphasised the learner as an active participant in their learning. That is, one who constructs their own understandings and meanings of the challenge at hand (Woolfolk-Hoy, 2005).

The teacher's role within the constructivist environment is to provide the learner with opportunities to engage and explore while challenging and guiding the learning taking place. Teachers provide a stimulating environment where children can actively explore and engage in the use of the resources available, some of which may include

ICT. Conversely, in a social constructivist approach, knowledge is embedded within the culture and the cultural symbols of society. Learning is constructed as a result of access to cultural tools, in conjunction with mediation by others (adult or more knowledgeable peer). The teacher plays a greater role here in the co-construction of the knowledge and/or scaffolding the learner leading to the learner completing the task unaided (Woolfolk, 1998).

To realise the goal of an enabled and enacted ICT curriculum teachers need to give consideration to the learning that occurs for children outside of the ECE setting. What Knobel and Lankshear (2003) call “out-of-school literacies” (p. 53). Through doing so teachers will be able to support and extend children’s learning (Vygotsky, 1978). What is evident is that children of today are enthusiastic users of ICT (Evans, 2004) and if teachers provide an educational programme based on socio-cultural theory, then this is an avenue through which they can link in with children’s interests, home lives and scaffold their learning.

The key lessons learnt from the literature and the interests of the different stakeholders have been synthesised to suggest a number of principles (see Table 2.2, p. 77). These principles could offer some guidance to the ECE sector in providing a more transformative ICT curriculum. In an enabled and enacted ICT curriculum teachers and the wider community would engage in discussion and debate about possible benefits and issues regarding the use of ICT with young children. Teachers would examine ICT through a critical lens to consider the societal, vocational and pedagogical imperatives for driving the use of ICT in education and more specifically the ECE context. As Wellington (2005) points out, all education “is a value laden process” and if teachers stop to critically reflect on whose needs are being met, then this helps to ensure issues remain “essentially contested” (p. 37).

Since the release of *Kei tua o te Pai* (Ministry of Education, 2004a) and the associated assessment practices, the importance of gaining multiple perspectives of children’s learning has been highlighted (Ellis & Foote, 2007). Parental involvement in early childhood services has been promoted in government policies (Ministry of Education, 1996a, 1996b) and there is widespread agreement that parental involvement in their

child's education programme is beneficial to their child's learning (Henry, 1996; Pascal, 1992). One form of involvement that is strongly advocated in the New Zealand ECE sector is that of partnership with parents. This partnership can take many forms, including parent education where parents may attend workshops or sessions, parent involvement in the programme where parents may work alongside children, and finally through a partnership approach. This partnership approach sees parents involved in making decisions and collaboration which is viewed as a key component of this approach (Carr, 2001).

Partnership at this level is about equality where power is divided equally. When this exists parents are drawn into decision making and policy issues (Stacey, 1991). Examples of this approach in practice can be seen at The Pen Green Centre for under fives, in Corby England and the Reggio Emilia preschools and infant toddler centres in Italy (Whalley, 2007). Rodd (2006) comments that the relationships in these settings are based on and "valued by equal but different contributions from, and shared accountability of parents and practitioners" (p. 225). Therefore, when considering an ICT enabled and enacted curriculum it is clear that parents have a key role to play.

A recurring theme in the literature is the significant role the teacher plays in providing an educational programme that is pedagogically appropriate. Moreover, because of the partnership model strongly advocated in the New Zealand ECE sector, parents' perceptions of the use of ICT in ECE also influence (directly or indirectly) the way teachers use technology within the educational programme. Children are, of course, the recipients of this curriculum; therefore it is imperative that their views are also considered. This review concludes by examining the principles (see Table 2.2, p. 77) of an enabled and enacted ICT curriculum and explores the implications for pedagogy and practice.

#### *Principles underpinning an enabled and enacted ICT curriculum*

A number of principles have been recommended in Table 2.2 that could assist ECE services to offer an enabled and enacted ICT curriculum. The theory that underpins each principle has been identified along with a brief acknowledgment of how this

would be reflected in practice. Links to how the use of ICT is reflected throughout the programme of learning, teachers' pedagogy and the ECE community are also explored. This section will briefly examine each of the proposed ten guiding principles.

As this review demonstrates, the use of ICT by young children has been vigorously debated which has resulted in stakeholders receiving mixed messages regarding any potential value that it may offer to the learning programme. Robust debate focusing on the value and purpose of ICT in the curriculum (Principle One) is vital. This will ensure that all stakeholders remain central to the direction that ICT takes in their communities.

Principle Two advocates that ICT should be offered using a holistic approach, which is reflected in the ECE curriculum. Integrating ICT across the curriculum in this way will ensure that it is used for authentic and meaningful purposes.

A shared ICT philosophy within the ECE setting will ensure that shared direction and consistent approach is taken to using technologies with young children. This review has highlighted that teachers' values and beliefs can greatly influence the subsequent learning programme. Therefore, in order for a shared philosophical approach to occur, teachers will need to be informed of current theory, engage in debate and challenge the viewpoint of others. This approach is evident in Principle Three.

To ensure that children have genuine equity of access to the learning opportunities provided through ICT, a strong infrastructure would need to be established in ECE settings. This would ensure that access to functioning and reliable equipment that was supported by ongoing technical support was available (Principle Four).

This review has highlighted the multimodal way in which children learn about literacy in the twenty-first century and is reflected in Principle Five. As previously stated this will require learners to develop new skills and knowledge, but more importantly diverse intelligences. Teachers can provide guidance here by promoting, mediating and valuing a multi-literate approach in the programme of learning. Modelling the diversity of ways in which literacy can be constructed is also a powerful teaching tool.

It is imperative that teachers do not take a technologically deterministic view to technology and remain open to debate and critique about its possible pitfalls and benefits. In order for teachers to make informed choices knowledge of both the technology and the ICT pedagogy is required. This knowledge could be gained through professional development opportunities and through trialling new initiatives. An essential component to the exploration of such initiatives is the critique and evaluation process. Teachers can ask about how useful ICT was for this purpose, does this work for the children in this centre in this context and what value does it add? This approach is reflected in Principle Six.

ICT in the context of ECE can be used to foster dispositions that demonstrate persistence, creativity and collaboration as shown in Principle Seven. This approach requires innovative teachers who actively promote exploration and innovation in their learning programme. Teachers scaffold children's learning in this context and encourage them to problem solve and collaborate with their peers. Children have the opportunity to learn about how to learn with and through the use of ICT.

Partnership with parents in ECE is strongly advocated in the New Zealand context. True partnership would mean that parents were involved in making decisions about the use of ICT in the ECE setting. This decision-making would include if and how ICT might be used, the purchasing of equipment and the supporting infrastructure. This is an approach that has been identified in Principle Eight and in order for this to occur teachers may be required to provide parents with information about the possible benefits and challenges of using ICT in ECE. This would ensure that decisions were made from an informed perspective.

Principle Nine advocates that teachers can use ICT to promote citizenship and skills for life in the ECE context by using ICT as a "powerful tool and topic" (Brown & Murray, 2006, p. 47). Children can be supported in becoming critical thinkers and consumers through being encouraged to critique the use of technology and to engage in discussion with teachers about implicit messages evident in digital media.

Principle Ten highlights the importance of teachers engaging in professional development that focuses on both the pedagogy and the technical use of ICT. Through participating in such experiences teachers can continue to engage in debate and have a current knowledge of wider pedagogical relating to ICT.

Table 2.2  
*Principles of an enabled and enacted curriculum for ICT*

	Principle	Theory	Practice	ICT use
1.	Teachers and parents are aware of, and engage in, robust debate around the value and purpose of ICT in the curriculum.	Critical Constructivist Social-constructivist Ecological	The use of ICT in the curriculum is actively debated and possible issues and benefits are explored.	There is a shared understanding of the use of ICT and lines of communication are open for any further concerns to be raised.
2.	ICT is used in a holistic way to promote collaborative, meaningful and authentic learning opportunities.	Ecological Social-constructivist Constructivist Information processing	Teachers build on children's interests about the natural world and extend this further into sustainability practices.	ICT is being used in the centre to further children's knowledge of environmental issues.
3.	Teachers' beliefs must align with the articulated philosophy and the educational culture.	Critical Constructivist Social-constructivist Ecological	Teachers' values and beliefs regarding the use of ICT with young children have been explored, challenged and debated. A shared philosophy of appropriate use is evident in practice.	A shared, consistent and educationally sound approach is evident when using ICT in ECE.
4.	Adequate and equitable access is required to hardware, software and to an ICT infrastructure.	Critical Social-constructivist	Centres have access to ICT to use in the programme of learning and an infrastructure is in place to support its ongoing use.	Access to functioning and reliable equipment is available in the centre. Technical assistance is reliably available.
5.	Children should be supported in developing multi-literate skills.	Social-constructivist Ecological Critical Information processing Critical	Teachers model the diversity of ways in which literacy is constructed and encourage children to participate in these multimodal ways of learning.	New skills and knowledge are developed through accessing information in multimodal ways.

	Principle	Theory	Practice	ICT use
6.	Teachers must engage in critique and ongoing evaluation of the use of ICT in the ECE context.	Critical Constructivist Social-constructivist	Teachers continually critique and evaluate the effective use of ICT in the centre and make any necessary modifications.	Reflection on practice is strongly evident in the programme. Teachers are knowledgeable of current research and approaches to using ICT and remain open to trialling new initiatives.
7.	Life-long learning is fostered where the child develops skills in how to learn with and through ICT.	Constructivist Social-constructivist Critical Social learning Ecological	Teachers remain up to date with current theories and approaches of using ICT. Innovation and exploration is promoted in the ECE environment.	The use of ICT fosters dispositions that demonstrate persistence, creativity, and collaboration.
8.	Parents and teachers work in partnership to advocate for appropriate technologies.	Ecological Social-constructivist Constructivist	Parents are consulted over the use of ICT by their children and have opportunities available to further their knowledge in this area. Accessing funds for ICT is a collaborative exercise.	Parents and teachers have a shared understanding of the possible benefits afforded by the use of ICT in ECE. They collaboratively access funding for ICT.
9.	ICT is used to promote citizenship and skills for life.	Critical Social-constructivist Constructivist Social learning	Children are encouraged to critique the use of technology. ICT is promoted as a tool to engage in critique of wider societal issues.	ICT is used to support children in becoming critical thinkers, critical consumers and critical citizens.
10.	Teachers have an ongoing commitment to professional development that focuses on both the pedagogical and technical use of ICT.	Constructivist Social-constructivist Critical Social learning Ecological	The way ICT is used in the curriculum continues to be debated and discussed. Teachers remain cognisant of the wider pedagogical issues of ICT use in ECE.	Teachers integrate ICT throughout the ECE programme innovatively to foster children's critical thinking and life-long learning abilities.

In summary, this section has discussed a number of principles that have been suggested as being useful in guiding an enabled and enacted curriculum of ICT. The next section draws together the knowledge gained through the literature review to state the research problem.

### *Statement of the research problem*

The literature review has shown that substantial debate continues regarding the role that ICT plays in the ECE environment. Some researchers suggest that computers are an important means through which children can explore concepts which otherwise would be very challenging to understand (Clements, 2002). They also emphasise that it is important for teachers to develop an awareness of how computers can be used appropriately from a holistic perspective (Clements, 1999). It follows that questions round the dynamic relationships between ICT, children, teachers and the context in which they are used have grown in importance (Edwards, 2005a).

There is a growing body of evidence to suggest that despite different drivers, it is the pedagogy that teachers apply when using ICT to enhance the educational programme offered that makes the difference, rather than the technology itself (Downes et al., 2001; Myhre, 1998; Williamson, 2005). In the past ICT professional development has been offered that focuses on the technical aspects with little direction offered regarding the pedagogical approach that could be taken (Cox et al., 1999).

A number of indicators or principles have emerged from the literature where ICT is likely to have a beneficial impact on young children. Given that the successful integration of these technologies is dependent on the values, beliefs and attitudes of all those involved in the ECE setting, there needs to be further investigation into what teachers, parents and children think of this phenomenon, and how, and to what extent, their perceptions mediate the use of ICT. The final section in this review identifies the research problem.

### *Statement of the research objective*

Over the past ten years, there has been a large increase in the type and amount of ICT available in ECE in New Zealand. In part, the new approach to assessment currently being advocated in early childhood education (Bolstad, 2004) has provided an impetus to purchasing and using ICT to document children's learning (Lee et al., 2002). The release of the ICT framework *Foundations for Discovery* (Ministry of Education, 2005) was accompanied by funding to provide a professional development programme for teachers. This focused professional development heightened the sector's awareness to what the possibilities of using ICT might consist of and encouraged centres to spend more money on hardware and software. As stated previously, the funding for such equipment in many ECE services comes directly from parents' fundraising, donations, or through fees. In New Zealand, ECE services work in partnership with parents and many of these services are managed by parent committees who have control over the purchase of new resources.

The perceptions that teachers, parents and children have concerning ICT use in ECE settings will also have an effect (directly or indirectly) on the purchase of these resources, subsequent teaching practice and the way children choose to use the technology.

It is evident that teachers' values, beliefs and attitudes towards the use of ICT can affect the role of the teacher, the educational environment and their commitment to professional development. More research about this phenomenon is called for to gain a greater understanding of the perceptions of the people involved (parents, teachers and children) with the use of ICT and the surrounding practices in ECE. The development of theories around this phenomenon will contribute to New Zealand-based research, inform parents' and teachers' understandings in relation to the use of ICT with young children, and assist in guiding the development of policy initiatives regarding ICT use in early childhood settings.

In conclusion, the objective of this research is to investigate the perceptions and practices surrounding the use of ICT in ECE settings. This will further the sector's

developing understanding of how early childhood parents and teachers can be supported to develop the knowledge and skill of integrating these new technologies into ECE programmes in authentic and meaningful ways. The next chapter will outline the research methods used to operationalise the objective in the context of the ECE setting.

## CHAPTER THREE

### Methodology

Discovery, insight, and understanding from the perspectives of those being studied offers the greatest promise of making significant contributions to the knowledge base and practice of education. (Merriam, 1998a, p. 1)

The aim of this study is to discover new insight and understanding of how parents', teachers' and children's perceptions of the use of information and communication technologies (ICT) in early childhood education (ECE) influence the surrounding practice in the New Zealand educational environment.

This chapter begins with identifying the research problem, and stating the research objective and supporting questions. An explanation of the methodological perspective that underpins the study is then provided, along with a description of data gathering and analysis procedures. The various phases of the research are identified, along with the overview of the timeline. Ethical principles and ways in which validity and reliability were assisted are discussed in relation to the research study.

#### *Research objective*

The objective of this research is to investigate the perceptions and practices surrounding the use of information communication technologies in early childhood settings.

The research questions that guided the study are:

1. What is the nature of the ICT learning experiences young children have in the home and ECE settings?
2. What are parents' perceptions of young children using ICT in the home and ECE settings?
3. What are children's perceptions of using ICT in the home and ECE settings?

4. What are teachers' perceptions of using ICT with young children in the ECE settings?
5. What issues, real or potential, do parents and teachers perceive with the introduction of ICT into ECE settings?

### ***Research methodology***

This research is located within an interpretivist research tradition. Interpretivist research aims to seek insight and understanding from multiple perspectives. "The interpretivist researcher's task is to understand socially-constructed, negotiated and shared meanings" (Hughes, 2001, p. 36). As Lincoln and Guba (2000) suggest, interpretivism is the process of making meaning within social contexts. Research into the use of ICT in ECE is a very new field and there is little research available about different stakeholders' perceptions of the use of ICT in early childhood. It is evident that a gap has been identified in the literature pertaining to this focus (Bolstad, 2004; Edwards, 2005a; Lee & O'Rourke, 2006). Therefore, adopting an interpretivist approach to this research will allow for data to be gathered to assist in informing a developing theory and pedagogical approach of the use of ICT in ECE.

### ***Research design***

Qualitative research aims to uncover the lived reality of the research participants and places the researcher with all their values and assumptions in that world (Denzin & Lincoln, 2000). Qualitative research involves looking closely at human behaviour and the reasons for it, and uses a range of methods to assist the researcher to make sense of, or interpret, the meanings that participants bring to the study (Denzin & Lincoln, 2000). In contrast, quantitative researchers often employ statistical methods to examine the phenomenon. Quantitative research assumes that the "world can be measured and that numbers capture the probability of truth" (Lankshear & Knobel, 2005, p. 29). The decision to use quantitative or qualitative research is about "fitness for purpose" (Cohen, Manion, & Morrison, 2000, p. 73) or as Lewis and Lindsay (2000) advocate, it is about which method is more appropriate to the researchers' questions and focus of their study.

This study employs a mixed method research design. In a mixed method research design, both quantitative and qualitative data are collected concurrently and have equal weighting. The purpose of incorporating a mixed method approach to this research is to build on the synergy and strength that exists between quantitative and qualitative research methods in order to secure an in-depth understanding of the phenomenon in question (Gay, Mills, & Airasian, 2005).

This research includes both qualitative and quantitative analysis. Qualitative analysis is utilised for analysing interviews and open ended survey questions and quantitative analysis is used to analyse many survey items (e.g., numeric data on years of experience, age, gender, rating of scale items).

Case study is the chosen research methodology and has been selected as it is intrinsically bounded and focuses on providing an in-depth understanding of the situation and the meaning for those involved (Cohen et al., 2000; Merriam, 1998a). Multiple case studies provide an opportunity for replication, and multiple case study design can be considered more compelling and studies more robust than a single case study (Herriott & Firestone, 1983).

A number of basic features of a case study make it an appropriate methodology for this research.

1. Case study begins with bounding of the case (Stake, 2000). The boundaries of this case are the family and the early childhood setting. Boundaries also include any direct influence on, or connection with, children's use of ICT in an ECE setting; this may include a parent's or teacher's perceptions of the use of ICT in ECE and their subsequent practices, which may all influence the case study.
2. Case study can make a valuable contribution to areas where little research has been undertaken. Most of the research has tended to focus on the debates regarding the use of ICT with children and its effect, for example, children's behaviour and interaction around computers. Investigations around the uptake of ICT, its pedagogy and integration into programmes of learning, access to

resources (including hardware and professional development), teachers' attitudes to ICT and studies, which reflect an ecological view of the child, have been undertaken. These have been carried out to explore children's experiences of ICT in ECE and in the home (including, access, ethnicity and gender). More recently, a growing number of case studies have highlighted innovative practices occurring with ICT in early childhood (Bolstad, 2004; Cox et al., 1999). However, as stated previously, little research has been conducted in the area of parents' and teachers' perceptions and practices surrounding the use of ICT in ECE settings and there remains a great many variables relevant to the concepts of this phenomenon yet to be identified.

3. Case study research is becoming more common in publications that are aimed at teacher audiences (Bolstad, 2004). Teachers find information presented in this way readily comprehensible and are able to integrate the findings into their practice. Case study is an appropriate methodology for this study, as it will provide a rich and vivid description of events related to the case and will present information in a more publicly accessible form enabling a wider audience to digest and interpret its insights (Cohen et al., 2000).

#### *Parameters of the study*

In order to make this project manageable, several limiting parameters were applied. The study used a multiple case study approach to investigate in-depth two early childhood services in one electoral district in Wellington, New Zealand, that were integrating at least two pieces of ICT in the educational programme offered. The study's aim was to examine how these centres used ICT in depth, rather than to generalise further.

The sample was restricted to six children in the two ECE services that agreed to participate in the study and met the criteria, which were based on gender and level of technology experience. This was a convenience sample of participants.

### *The research sample*

In this study, a purposeful sampling approach was employed (Patton, 1990). This approach is based on the assumption that the researcher wants to develop an understanding and insight into the phenomenon being investigated and, in order to do so, must select a sample from which the maximum can be learned (Merriam, 1998a). As Patton (1990) argues, “the logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term purposeful sampling” (p. 169). Therefore, when identifying the purposeful sample for this study, a specific criterion for participation has been applied.

Two different early childhood services located in the greater electoral district that were integrating a minimum of two pieces of ICT in their educational programme with young children were selected to participate in this study. These items could include, but were not limited to, digital cameras, computers, faxes, videos and so on. The ECE services that were selected to participate in the study included a kindergarten and private education and care centre. The purposeful sample for this study included all teachers, parents and children attending the ECE setting who were selected and who agreed to participate in the study.

### *Site / subject selection*

The population sample in this study included all head teachers/supervisors or nominated persons in each ECE service in one electoral district of Wellington. These participants in an initial questionnaire sent as part of Phase One of the study indicated willingness for their services to participate further in the study.

Two ECE services were selected and all teachers and parents from each of the ECE settings were asked to provide data for the study in the form of a questionnaire. Parents indicated on this form a willingness to have their child participate in the study and agreed that the researcher could contact them to discuss this further. For the purpose of this study the generic term “parents” will be used throughout the thesis, although this may include parents, step parents, grandparents or foster parents.

Subsequent data involved all teachers and a selected group of children willing to participate in interviews from each of the ECE services represented in the study. Pseudonyms were used for teachers and children involved in this study.

### ***Methods of data collection***

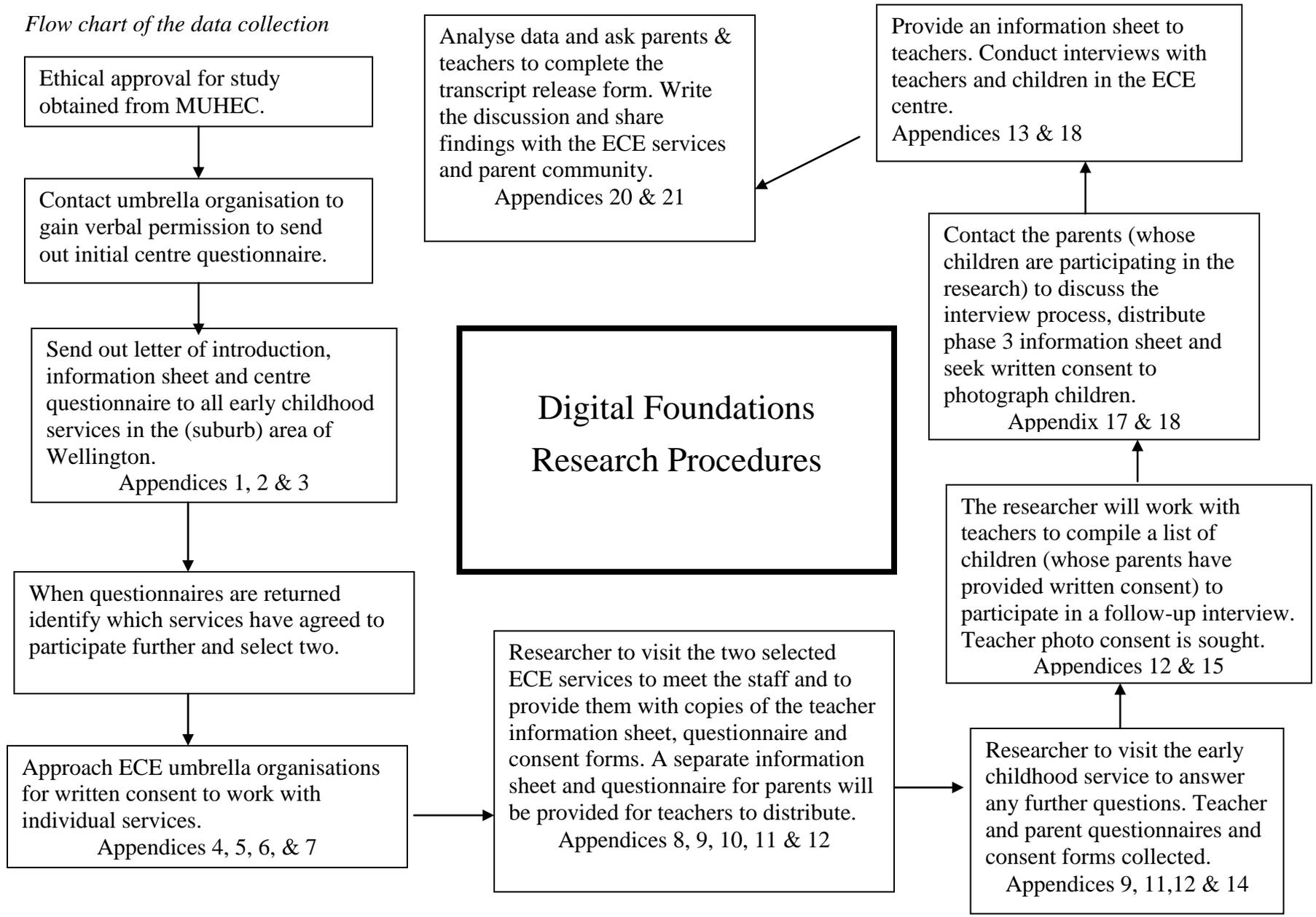
In this study, data gathering methods included questionnaires and semi-structured interviews. The data were gathered from the sample groups identified in the timetable below.

- Questionnaire sent to all ECE services in one electoral district of Wellington in July - August 2007.
- Questionnaire distributed to participating early childhood services in August – September 2007.
- Semi-structured interviews with teachers and selected children from each ECE service September – October 2007.

Table 3.1 provides an overview of the research procedures in a step-by-step process.

Table 3.1

*Flow chart of the data collection*



### *Questionnaires*

Hinds (2000) suggests a questionnaire is best used when the information sought is not too complex and is from large numbers over a relatively large geographical area. As this survey was sent to all centres in one geographical area, it was an appropriate method to use to gain an overview of practices within that region. The questionnaire did produce the information required and this data collection method was appropriate for the size and composition of the sample group.

There are a number of common and possible errors that may occur through the use of a questionnaire to collect data (Cohen et al., 2000). These include respondents saying what they think the researcher wants to hear, interpretation errors by the respondent and the researcher, and insufficient or incorrect response categories. There will, however, be some check on this through the teachers' interview process. However, the results of the surveys can be compared with the teacher interviews, which may illuminate any errors, omissions or misrepresentations.

### *Interviews*

Interviews were selected as an appropriate data gathering method with teachers and children as they are a purposeful interaction in which one person tries to obtain information from another. As Kvale (1996) suggests, "an interview is literally an interview, an interchange of views between two persons conversing about a theme of mutual interest" (p. 2). Interviews can be conducted in three ways. For example, they can be highly structured, entirely unstructured or semi-structured (Merriam, 1998b). A highly structured interview is tightly controlled through the use of pre-determined questions asked sequentially, whereas unstructured interviews are more like a conversation where the interview may discuss a number of key issues (Cohen et al., 2000). A semi-structured interview often includes a list of pre-prepared questions that guide the interview, and allows flexibility to follow up on relevant comments made by the interviewee (Lankshear & Knobel, 2005).

The present study used semi-structured interviews as the primary means of data collection. This data gathering technique was chosen as an appropriate instrumentation method because it was flexible, it had the ability to probe participants,

allowed for detailed qualitative data to be collected and it provided further insight into the survey findings. This approach also enabled the researcher to obtain the information required without undertaking direct observation. Time and financial constraints also meant that the research did not include interviews with the parents of the children attending the ECE centres. A limitation of this approach was that parents did not have the opportunity to elaborate further on the views that they had shared in their parent surveys.

### *Interviews with children*

Over recent times the concept of childhood has changed, particularly in the western world. Childhood is seen as a distinct and intrinsically interesting phase of life and valued in its own right, rather than being seen merely as part of a journey to adulthood. This new construct influences the view that we have of the child and emphasises the need for children to be viewed as complete individuals having a perspective of their own. The Convention on the Rights of the Child (United Nations, 1992) was an important statute in recognising that children have rights, including the right to voice an opinion in matters that concern their own lives. On the basis of this, interviews with children are increasingly being used as a method of obtaining rich data about their views on particular issues.

As David (1992) stresses, “in the past, interviewing children, especially young children, has been seen as a very flawed research method” (p. 208). Standard methods of interviewing have proven to have their limitations; nevertheless studies have shown that children can be reliable, informative participants (Spencer & Flin, 1990). Piaget (1929, cited in Brooker, 2001) suggested that when interviewing children it is important to provide an environment where children can talk freely. Over time, early childhood research has relied on the use of props to encourage and sustain interest, foster thought and reflection, and to create a less stressful, more fluid interview environment (Brooker, 2001).

In this study I have used two projective techniques to assist in encouraging children to feel more at ease and to actively engage in the topic at hand. A projective technique uses ambiguous stimuli in which the participant projects attitudes, opinions or self-concept into a situation in order to give it structure. In the field of early childhood much research has used stimuli to “engage children’s interests, foster thought and reflection, and soften the effects of the high-control, adult-dominant, question-and-answer format” (David, 1992, p. 210). A projective method has been used as an eliciting device to generate interview data (Lankshear & Knobel, 2005).

The first technique employed was the use of photographs as a point of discussion. These photographs were of the child being interviewed engaged in using any of the ICT experiences available in the centre environment. Forman and Fyfe (1998) advocate that photographs can be used as a tool to stimulate discussion about the event and through doing so act as catalyst for looking at a sequence of events.

Children were also invited to participate in an art experience (drawing), which was used as a tool to further explore children’s perceptions of the use of ICT in their ECE settings. This strategy is widely recognised as an effective and respectful way of initiating and engaging children in discussion (Morrow & Richards, 1996).

Potential limitations of this approach may include the child becoming distracted by the props used to illicit conversation about the focus of the research and also by the technology used to document and or record the conversations that occurred. If this were to occur, the researcher would follow the child’s lead initially whilst endeavouring to redirect the conversation back to the research focus.

### ***Procedures***

Three phases to the research were undertaken, enabling the researcher’s focus to move from a larger group to a smaller sample, which provided the opportunity to learn a great deal about the issue of central importance to this research. The research has been conducted in this way as factors such as expense, time and access to ECE services have all required consideration. In this section each phase of the research will be discussed in greater detail.

### *Phase One*

In Phase One a survey was conducted using a questionnaire accompanied by a letter of introduction and an information sheet (Appendices 1, 2 & 3). This was sent to all head teachers / supervisors or a nominated person in kindergartens and education and care services in one electoral district. Before distributing the questionnaire to the ECE sector, key informants were asked to review it to ensure questions were clear and not ambiguous. Key informants include representatives from early childhood and other educational organisations in New Zealand. This provided useful feedback for refining the questionnaire. The questionnaire, while containing both closed and open-ended questions, was structured to obtain mostly quantitative data. Mutch (2005) offers some advice for setting out successful questionnaires which was incorporated into the design of this study's questionnaire. This included keeping the questionnaire to a reasonable length, clear and uncluttered, careful wording of the questions, and consideration of how to maximise ease of completion for the respondent and ease of analysis for the researcher. In Phase One thirty-five questionnaires were distributed and fourteen were returned (40%).

A number of follow up procedures were also used to increase the return rate for questionnaires in Phase One. These included a reminder letter being sent to centres prompting the further return of questionnaires.

### *Phase Two*

In Phase One an indication of interest was sought to participate further in the study. Two ECE service types were then selected using the preset criteria of integrating at least two pieces of ICT in the programme of learning.

A letter seeking participation and a consent form (Appendices 4, 5, 6 & 7) were sent to the ECE centre's umbrella organisation i.e., kindergarten, owner or management board. Upon gaining consent from the guiding body, individual centres were approached to participate in phase two of the study. In this phase all teachers and parents were asked to respond to a second questionnaire (Appendices 9 & 11). This questionnaire was delivered with an information sheet (Appendices 8 & 10) outlining the study and a consent form for the teachers and parents who agreed to their child's participation in an interview (Appendices 12 & 14).

Information was also gathered and documented to describe the individual centres, for example the location of the centres, demographics, and location and number of enrolments as this information provided rich background data to inform the study further. A total of ten teachers were employed in the ECE services selected and the response rate to their questionnaires was 70%. Teachers indicated their willingness to participate in phase three of the research by returning the consent form with their completed questionnaire.

One hundred and thirty five families were enrolled across the two ECE centres and 22% responded to the survey. From the group that responded 73% of parents indicated through returning the consent form that they agreed to their child participating further in the study.

A number of strategies were put in place to facilitate the ongoing and timely return of the parent questionnaires in the researchers absence in Phase Two. The researcher provided a labelled, sealed box in the centres for parents to return their questionnaires. Also at the researchers request the teachers put reminder notices on the whiteboard and verbally prompted parents about return dates. The researcher kept in contact with teachers via email to remind them of these due dates. In negotiation with teachers, dates were also extended for the return of the questionnaires in anticipation of increasing the response rate. Relying on a third party to ensure reminders were administered may have contributed to the low response rate.

### *Phase Three*

In Phase Three individual interviews were conducted with five teachers and a selected group of children. The criteria for the selection of these children included their gender and level of use with ICT in the ECE setting. This decision was made in negotiation with the head teacher / supervisor of the ECE setting. Parents were contacted to discuss Phase Three of the research and to seek their written consent (Appendix 17) to photograph their child engaged using ICT in the ECE centre. Information sheets for this phase of the research (Appendix 16) and consent forms for the transcription of the taped interviews (Appendix 12) were also made available.

Teachers were also provided with information sheets (Appendices 2, 8 & 13) and asked to sign consent forms for the transcription of their taped interviews and to photograph them (Appendix 15 & 21).

Individual interviews were conducted by the researcher and were tape-recorded. The research questions guided the data gathering process (Appendix 18). Photographs of ICT equipment in the individual ECE settings were used to explore and probe teachers' responses to gather more in-depth data about their experiences and feelings. Interviews with teachers about their perceptions of using ICT with young children and subsequent practices provided the data required to verify and corroborate the information gathered through the questionnaires. The use of photographs in the interview process also enabled the researcher to identify any miss-matches between what teachers' perceptions of ICT use were and subsequent practices.

Individual tape-recorded interviews with children were also conducted in the ECE setting. While the research questions (Appendix 18) guided the initial discussion the interview itself was informal and made use of props (photographs and drawing) to engage children's interest and foster thought and reflection about the topic under discussion.

### *Data analysis*

Whatever exists at all exists in some amount. To know it thoroughly involves knowing its quantity as well as its quality. (Thorndike, 1918, cited in Ackerman & Lohman, 2006, p. 146)

#### *Quantitative analysis*

The following calculations and presentations were made for each category of quantitative questions in the questionnaire:

- central tendency calculations including mode, median and mean
- frequencies to identify if responses cluster around one or two responses on the rating scale
- percentages

- variability calculations, including range and standard deviation, were calculated for some questions such as years of service
- bar graphs, other graphs, and tables are used to present the results visually.

When analysing the data only descriptive statistics were used because the small numbers prevented further analysis.

### *Qualitative analysis*

...data analysis in qualitative research has been something like a mysterious metamorphosis. The investigator retreated with the data, applied his or her analytic powers, and emerged butterfly-like with findings. (Merriam, 1998b, p. 155)

Analysing data through using a constant comparative process method involves identifying patterns and themes and making comparisons across categories, which may lead to the identification of new dimensions, categories and codes (LeCompte & Preissle, 1993).

The aim of the coding is to look for patterns and themes and is an ongoing process throughout. It is a cyclical, iterative process of reviewing data for further themes. In this study data were coded and analysed using a method suggested by LeCompte and Preissle (1993). The steps included perceiving, comparing, contrasting, aggregating, ordering, establishing linkages and relationships, and speculating theory.

Memo writing was used to elaborate on personal understandings of the data and built on the information emerging through the coding undertaken. It enabled records of developing thoughts about the data to be collected. Graue and Walsh (1998) advocate that memo writing is “a higher level than codes in that they are conceptual and theoretical in nature, exploring the meanings of your observations or interviews” (p.166).

Qualitative research can present many methodological challenges and concept mapping is a further strategy that can be used in the analysis of data. Concept mapping is a way of thinking on paper and can be used to make visible an implicit theory or clarify existing theories; it can also help to highlight unexpected connections or contradictions (Maxwell, 2005).

Coding procedures, concept mapping and memo writing have been used as data analysis strategies in this study. Information obtained from the interviews has been coded in a systematic way. Memos were used as a method of early analysis and concept mapping, and have assisted in extending the data analysis process to make visible implicit theories, connections and contradictions.

Throughout the research process, teachers and other participants in the research were involved in the verification of the data. Transcripts of the interviews conducted were returned to teachers and parents of the children who participated for verification. Parents were encouraged to share these transcripts with their children. This process of verification did result in some further clarification and minor amendments.

### ***Trustworthiness***

#### *Reliability and validity of the data*

According to Anderson (1999) “every approach and data collection instrument has strengths and limitations as well as reliability and validity considerations” (p. 164). Quantitative and qualitative paradigms use different rhetoric to convince its audience of its trustworthiness. Firestone (1987) advocates:

The quantitative study must convince the reader that procedures have been followed faithfully because very little concrete description of what anyone does is provided. The qualitative study provides the reader with a depiction in enough detail to show that the author’s conclusion makes sense. (p. 19)

Therefore, when considering the reliability and validity issues in this mixed method study, careful attention has been paid equally to both quantitative and qualitative methods.

Efforts were made to ensure that this project did not duplicate existing research, e.g., a wide literature search was undertaken.

### *Reliability issues*

Through having one person (the researcher) conduct all the interviews, a high degree of consistency in the structure and content of the interviews was evident. These were used to explore teachers' and children's perceptions and these, by definition, are subject to variation. However, the structured nature of the interview assisted in minimising risks to reliability.

### *Validity issues*

“All research is concerned with producing valid and reliable knowledge in an ethical manner” (Merriam, 1998b, p. 198). Validity is an essential requirement of both quantitative and qualitative research. Cohen et al. (2000) hold that it is impossible for research to be 100 per cent valid, and point out that validity should be seen as a matter of degree. Hence we “strive to minimize invalidity and maximize validity” (Cohen et al., 2000, p. 105). Outlined below are possible threats to both internal and external validity of this research plan.

The threats to internal validity in this research plan are:

- surveys are subject to participants furnishing what they consider desirable responses as opposed to what their true perceptions are
- surveys are subject to misinterpretation and this may negatively affect validity.

These points have been addressed through the initial trialling of the surveys with parents who were not included as part of the study to ensure that the surveys were as clear as possible. Participants also had the option of not including their names on the surveys, which may have enabled them to speak more freely in their responses.

### *Content validity*

The questionnaire was designed to collect data from teachers and parents affiliated to the early childhood centres surveyed. The questionnaire provided data in terms of access to ICT, teachers and children's use of ICT, the perceptions of teachers and parents regarding ICT use by young children, potential issues in ICT use in ECE, teacher qualifications and years worked in ECE.

The literature reviewed and an existing survey used in educational research (Williamson, 2005) informed the development of the questionnaire. Before distributing the questionnaire key informants from early childhood services and institutions provided useful feedback for further refinement.

### *Ethical considerations*

...the only safe way to avoid violating principles of professional ethics is to refrain from doing social research altogether.  
(Bronfenbrenner, 1952, p. 453)

Entering any environment to conduct research can be a potential minefield and it is the responsibility of the researcher to give due consideration to possible ethical issues that may arise. This section will outline some generally accepted notions in research ethics that have been considered in this research study.

### *Informed consent*

Umbrella organisations and all participants were informed about the nature of the study, the expectations of them and their involvement in the research, and it was made clear that they could withdraw from the research study at any stage up until data analysis. This information was relayed through letters of introduction, and detailed information sheets for every phase of the research were provided (Appendices 1, 2, 4, 5, 8, 10, 13 & 16). All participants were also invited to contact the researcher or supervisors to clarify any questions that they may have had.

Parental consent was obtained for children to participate in the research (Appendix 12). Before the actual interview began the researcher obtained verbal assent from the child (Appendix 18).

#### *Research involving indigenous groups*

The following steps ensured the researcher is culturally sensitive in working with Māori:

- a cultural advisor was appointed to the researcher to provide guidance when working with Māori; and
- no research was conducted in total immersion centres.

#### *Confidentiality*

To ensure confidentiality for the participants (parents, children and teachers) coding was used during the gathering and processing of the interview notes, tapes and transcripts. The data are stored (for a period of five years) in a locked filing cabinet and in a password-protected computer in the researcher's home, protected by deadbolts. In the confidentiality statement included in the covering letter reassurance was given to all participants that their information would remain confidential and that no research participants or ECE centre would be singled out for identification. The data are also presented in a form that ensures complete anonymity of any participants.

#### *Right to withdraw*

The right to withdraw from the study at any time was made clear to research participants. It is a privilege for researchers to enter into an ECE centre and to work with the members of that community. It does, however, not give them any rights over the participants, nor oblige them to remain part of the research. In this study the right to withdraw or to decline to participate in the research was made clear at each phase of the research and on all information sheets (Appendices 2, 8, 10, 13 & 16).

Ethical propriety is referred to by Leedy (1997, p. 116) as involving “simple considerations” which include respect, openness, disclosure of methods, integrity, honesty and fairness. This researcher used this approach in the work undertaken with families and centres.

### *Summary*

This chapter has explained and justified the interpretivist approach adopted by this research to generate data to examine parents’, children’s and teachers’ perceptions regarding ICT and their surrounding practices. This approach is consistent with the research design and methodology, and the theoretical underpinnings of the study. Data gathering and analysis procedures have been outlined. Ethical principles and issues of validity and reliability have been discussed in relation to this project. The following three chapters present the results of the various phases of the research.

## CHAPTER FOUR

### Results of Phase One

The use of information and communication technologies (ICT) in early childhood education (ECE) settings is initially dependent on the equipment that centres have access to. Therefore, the purpose of the first phase of this research was to ascertain information about the level and type of use of ICT in ECE services. This information was sought through a questionnaire that was distributed to all early childhood services (with no cultural affiliations) in one geographical location in the Wellington area (Appendix 3). This questionnaire was addressed to the head teacher / supervisor or nominee (a person who had the knowledge to complete the questionnaire accurately).

#### *A review of the participant information*

The number of teachers employed in the responding centres ranged from two to eight, with the average being five and the median, three teachers. Within the responding centres 70% of teachers were in full-time employment and a further 30% were employed part-time.

#### *A review of the centre information*

Thirty-five questionnaires were distributed and fourteen were returned (40%). Four service types responded to this questionnaire; these included six full-time education and care centres (43%), five sessional-based kindergartens (36%), two parent facilitated Playcentres (14%) and one Montessori centre (7%). Centres were asked to identify what age group of children they taught. As illustrated in Figure 4.1, no centres operated specifically for under two year olds and the largest group of respondents (57%) taught mixed age groupings.

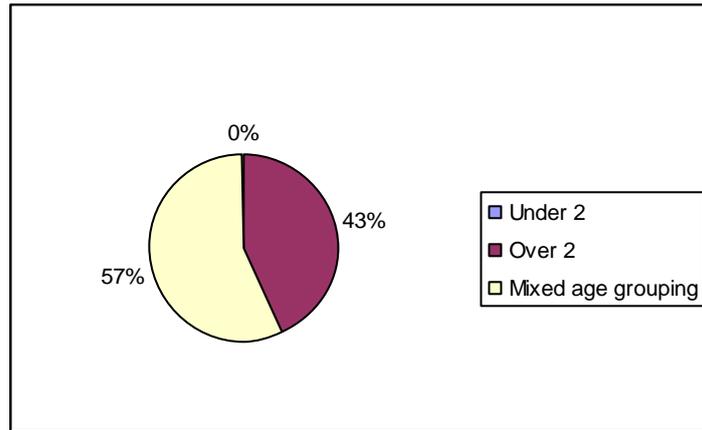


Figure 4.1. Age group of the children in participating centres

### *Level and type of ICT available*

This survey also sought to examine what kinds of ICT centres were using. Figure 4.2 summarises the responses to the question “what kinds of ICT does your ECE service have?”

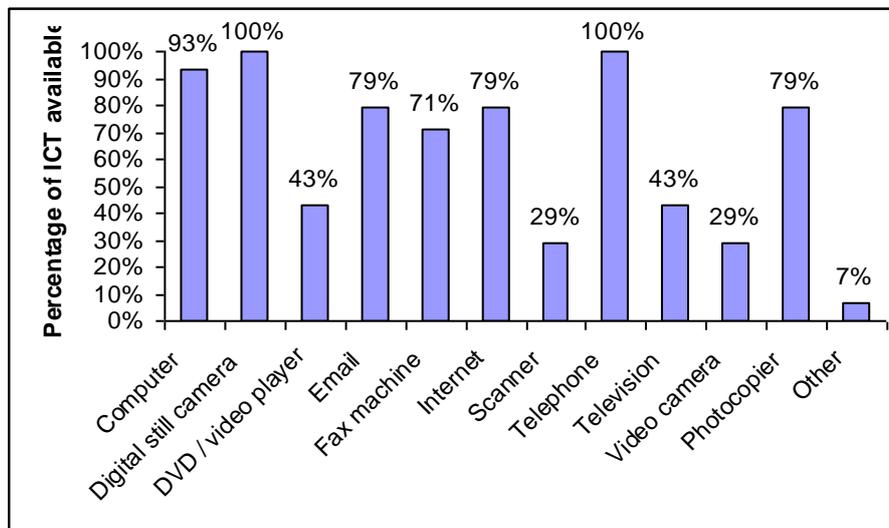


Figure 4.2. Type of ICT available in the centre

Figure 4.2 shows the technology that centres were most likely to be using includes a digital camera (100%) and a telephone (100%), but only four (29%) centres had access to a scanner and video camera. Thirteen centres (93%) had access to a computer, including one ECE service (a Playcentre) that made use of their personal computers for processing photos.

Respondents were asked to identify how many computers they had available for use. One centre indicated that they did not have a computer (although it does make use of personal computers for the centre's work). For those with computers, the number ranged from one to five and the median number of computers per centre was two. Eleven of the centres indicated that they had access to three computers or less.

Centres were asked to identify the location of the computers and this data is illustrated in Figure 4.3.

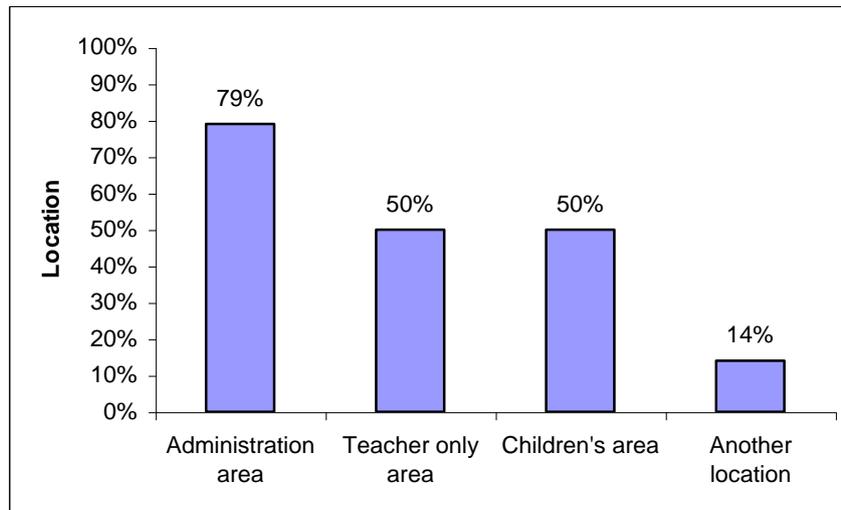


Figure 4.3. Location of the computers

As Figure 4.3 shows, generally the computers were available in the administration (79%) or teacher only area (50%). Access to computers was made available to children in a children's area of the centre in 50% of the centres. Six centres made use of laptops and three of these respondents indicated that they made supervised use of the laptop available to children.

Respondents were asked to indicate who had access to these computers. Figure 4.4 provides an overview of the data.

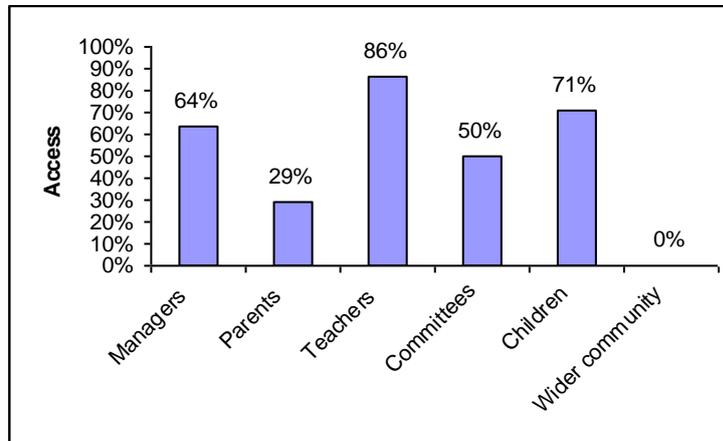


Figure 4.4. Access to the computers

Teachers have the highest level of access to the computers (86%) and children have access in 71% of the centres. No members of the wider community had access to the computers in any of the early childhood services that participated in this study.

The age of the computers in the centres was also enquired about. Table 4.1 provides a summary of the results.

Table 4.1

*How up to date are the computers?*

Type of service	1-2 years	3-5 years old	6-10 years
Kindergarten	23%	31%	0%
Education and care	38%	15%	0%
Playcentre	0%	0%	8%
Montessori	8%	0%	0%

The data demonstrates that education and care centres are using the largest percentage (38%) of up to date computer technology and Playcentres are using the most outdated equipment ranging from between six and ten years old.

Centres were asked to describe the original source of their computer equipment. Figure 4.5 illustrates where the available computers in centres had originated. A large percentage (76%) of computers have been made available through fundraising ventures or donations. The kindergarten association was also identified by 23% of kindergartens as funding the purchase of computers or they were funded as a one off cost included in the establishment of a new centre. In one case, the teacher was using personal equipment in the centre. Eight of the centres indicated that they were using their operating budget to finance the purchase of the computers.

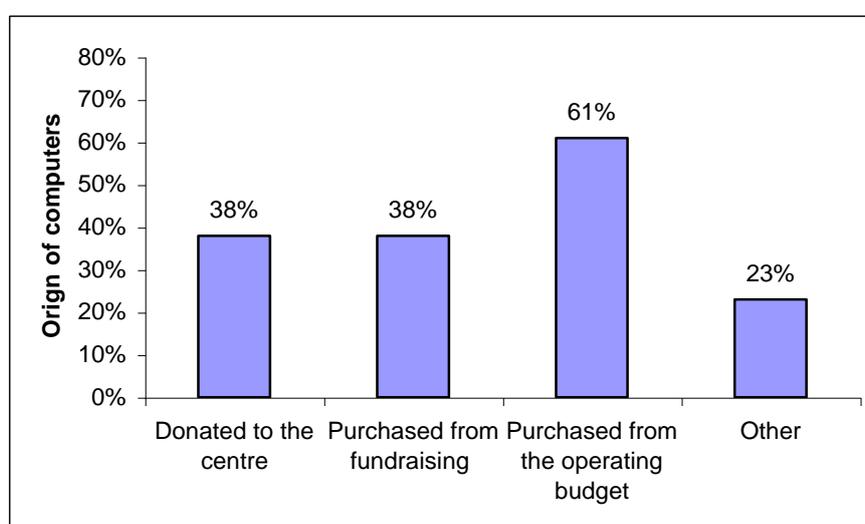


Figure 4.5. The origin of the computers

Information about access to the internet was also sought from centres. The results show that kindergartens (100%) and education and care centres (100%) are most likely to have an internet connection and, in this study, Montessori (0%) and Playcentre (0%) are least likely. A total of 11 centres (78%) had internet access.

Table 4.2 demonstrates that the majority (93%) of centres reported that they use ICT on a daily basis for administrative purposes and to record information about children's learning.

Table 4.2

*Use of ICT and frequency*

<b>Successful use of ICT</b>	<b>Not used</b>	<b>Daily</b>	<b>Few days</b>	<b>Weekly</b>	<b>Monthly</b>
Administration	0%	93%	0%	0%	0%
Searching the internet to support teaching & learning	21%	14%	21%	14%	14%
Communication with professional organisations	7%	64%	21%	0%	0%
Recording information about children's learning	0%	93%	0%	0%	7%
Other	0%	0%	0%	0%	0%

Respondents were asked to identify what has been the most successful way that the centre had used ICT. Eleven of the centres indicated that the use of the digital camera had been most successful. Seven centres also reported using these images in recording children’s learning moments and integrating them into their portfolios. Comments included:

*Taking photos and discussing them with the children and having children help construct a learning story. (Kindergarten)*

*Children taking photos and then viewing them on the PC. (Education & care centre)*

*The level of ICT use by children*

The use of ICT by children is a recent phenomenon in early childhood centres and this study sought information about the frequency and type of use that children are engaging in while attending a centre. This section reports on the results of this part of the data collection. Figure 4.6 summarises the responses to the question “if children use ICT in your centre, what percentage used ICT in the last week?”

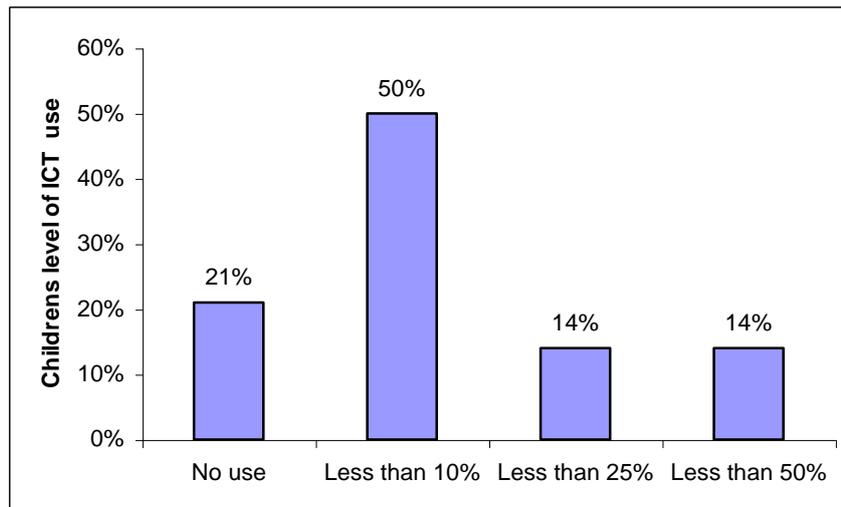


Figure 4.6. The percentage of children using ICT in one week

Figure 4.6 illustrates that in only two centres do half of the children use ICT in a given week. Moreover, fewer than 10% of children in nine of the remaining centres use ICT on a weekly basis. Three centres (21%) indicated that they do not use ICT at all with children.

Centres were asked how often children would engage in these ICT experiences. This information is presented in Table 4.3.

Table 4.3

*Frequency of children's use of ICT*

Activity	Daily	Weekly	Monthly	Never
Taking photographs	43%	14%	21%	21%
Making videos	0%	21%	0%	79%
Playing computer games	21%	14%	0%	64%
Searching on the internet	7%	21%	36%	36%
Watching DVDs / videos	0%	7%	36%	57%
Creating own presentation	0%	7%	14%	78%
Sending & receiving email	7%	0%	7%	86%
Talking on the telephone	7%	7%	7%	78%

Taking photographs (43%) and playing computer games (21%) are the ICT related activities that children may have available to them on a daily basis, as shown in Table 4.3. While over the course of a month children may be exposed to a variety of ICT experiences, they are least likely to have the opportunity to talk on the phone, be involved in sending an email, make a video or create their own presentation. The Montessori centre did not use ICT with children and the Playcentres used only the digital camera or the telephone.

### Ongoing professional development of teachers

As the research literature indicated, having sufficient knowledge of the technical aspect of using the hardware and software and knowledge of how to integrate ICT into children’s learning in meaningful and authentic ways is of the utmost importance in ECE (Siraj-Blatchford & Whitebread, 2002). In the initial survey respondents were asked to indicate where they continue to learn about ICT. Figure 4.7 shows how respondents stated that they were supported in further developing this knowledge.

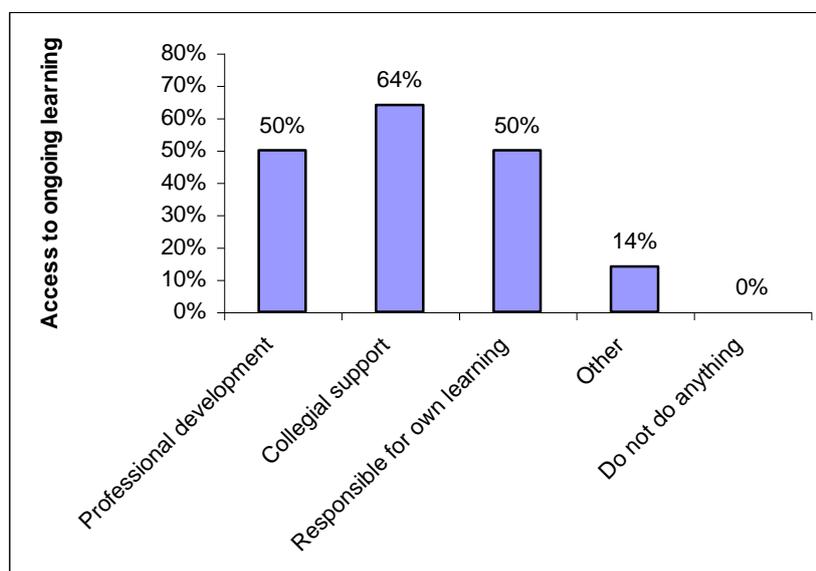


Figure 4.7. Where do teachers continue to learn about ICT?

Collegial support was the most frequently used method of assistance with nine teachers indicating that they used this approach. Seven respondents undertook formal

professional development opportunities and seven indicated that they were responsible for their own learning. A number of respondents indicated that they fitted into more than one category i.e., professional development courses, collegial support and being responsible for their own learning. Two respondents stated that when using ICT in ECE they drew on their “outside knowledge” which had occurred through employment or personal study.

Respondents were asked to rate their level of ICT use and this is reported in Table 4.4.

Table 4.4

*Rating the overall level of ICT use*

<b>Level of use</b>	<b>E &amp; C centre</b>	<b>Kindergarten</b>	<b>Playcentre</b>	<b>Montessori</b>
Not a high priority & little use	0%	7%	7%	0%
Teachers are willing but struggling to adopt	0%	0%	0%	0%
Steady progress & increasing use	36%	28%	0%	0%
Routine use on a daily basis	21%	14%	7%	7%

No teachers indicated that they were finding ICT a struggle or a challenge to adopt in their centre environment as evident in the findings illustrated in Table 4.4. The education and care sector indicated that they were making steady progress in the use of ICT.

*Summary of emerging trends*

At the end of Phase One a number of themes have started to emerge. Centres commonly had access to a wide range of ICT for administrative and assessment purposes, with the education and care sector using the most up to date equipment. A large proportion (76%) of ICT equipment centres had was purchased through fundraising or donated to the centre. The education and care sector had access to the most up to date technology, which was predominantly funded out of their operating budget.

The use of ICT by children in centres appeared to be generally accepted by the education and care sector and kindergartens. The Playcentres that responded to this survey differed in their approaches (one made a digital camera available to children) while the Montessori centre that completed the survey chose not to make any form of ICT available to the children.

Restricted ICT access was available to children in eleven of the centres with only two centres indicating that half of the children use ICT in any given week. Children who did access ICT were most likely to engage in taking photographs or playing computer games.

Professional learning with regards to ICT was multifaceted with collegial support being the most frequently used method to learn new skills. Teachers also attended formal professional development programmes and drew on knowledge from their personal lives. Teachers representing both the education and care sector and kindergartens reported that they were making steady progress with the use of ICT

### ***Summary of Phase One of the research***

Phase One of the research has established the level of ICT that is available in a representative sample of centres in one geographical location in Wellington. It has provided a snapshot of the type of use by centres with a particular emphasis on teachers' and children's use of ICT. Data has also been gathered about how teachers are supported in their on-going ICT learning. At the completion of Phase One centres were asked to indicate an interest in participating further in the study. Fifty percent of the respondents indicated a willingness to participate further. The following chapter describes the results for Phase Two, which consisted of individual questionnaires being distributed to the teachers in two selected early childhood services (a kindergarten and an education and care centre).

## CHAPTER FIVE

### **Case study of a Kindergarten**

This chapter reports the findings of a single kindergarten. Phase One of this research sought to identify information about the level and type of use of ICT in ECE services. From the wider population involved in this survey, a purposive sample of two early childhood service types located in a specific geographical area were selected on the basis that the centre integrated at least two pieces of ICT into their educational programme.

The purpose of Phases Two and Three was to ascertain information about teachers', parents' and children's perceptions and practices of using ICT in these ECE centres. Phase Two involved all of the teachers employed in the kindergarten (n=3) and the parents of the children attending were invited to complete a questionnaire (see Appendices 9 and 11). All the teachers and 24 families (27%) from this kindergarten responded to this questionnaire.

In Phase Three, two teachers and a group of children who were selected based on gender and level of technology experience (which was a convenience sample) were involved in individual interviews.

The first set of results relate to the data drawn from the questionnaire sent to all of the teaching team. Note that the teachers have fictitious names to protect their identities.

#### ***Teacher's background data***

Three teachers were employed in the kindergarten and all worked full time. The teachers were all female and two indicated that they were 50+ years and one responded that she was aged between 40-49 years. Table 5.1 provides an overview of the teachers' qualifications, their level of teaching experience, any internet access and professional development. All of the teachers in the kindergarten held a teaching qualification. Bridget had been awarded equivalency to the Diploma of Teaching. This was a system designed in 1990 to assist existing practitioners with a range of qualifications and experience to become qualified. Individuals had their qualifications accredited and were told which courses they needed to complete to gain an

equivalency diploma (May, 2001). Angie held a Diploma of Teaching and Celine held a postgraduate degree.

Table 5.1

*Background data on the kindergarten teachers*

Teacher	Qualification	Experience ECE	Professional development	Internet access in the home
Angie	Diploma of Teaching ECE	15 years	Yes	No internet access
Bridget	Equivalency to Diploma of Teaching ECE	24 years	Yes	Broadband
Celine	Master of Education	17 years	Yes	Broadband

The teachers were asked to comment on their personal ICT experiences. All of them (n=3) reported that they had access to a home computer. Two of the teachers had access to the internet and both indicated that they had broadband, that is, relatively fast internet.

Teachers were asked to identify how long they had worked in the ECE field and had held their current position. Table 5.2 shows that teachers had spent an average of four years in their current position and had taught in the ECE sector for a median of 17 years.

Table 5.2

*Level of teaching experience*

<b>Teaching experience in years</b>	<b>Mean</b>	<b>Median</b>	<b>Range</b>
Worked in ECE	19	17	9
Current position	4	3	3

*Teachers' use of ICT in the kindergarten setting*

Teachers were asked to indicate how their level of use of ICT had changed, if at all, over the past two years. Table 5.3 demonstrates that the perceived frequency of ICT use has increased substantially over the past two years. The largest increase in ICT reported was the digital camera, the internet, and educational software. All teachers indicated that these applications are being used “more” or “much more frequently”. Notably, the television has seen the biggest decline in use (33%).

Table 5.3

*Frequency of use*

<b>Type of ICT</b>	<b>Much less</b>	<b>Less</b>	<b>Same</b>	<b>More</b>	<b>Much more</b>
Computer	0	0	1	1	1
Digital camera	0	0	0	2	1
Video camera	0	0	1	2	0
Internet	0	0	0	2	1
Computer software	0	0	1	2	0
Television	1	0	2	0	0
DVD / Video player	0	0	1	2	0
Fax	0	1	2	0	0
Email	0	0	1	1	1

Teachers were asked to rate their technical skills in relation to using ICT when teaching adults or sharing their knowledge with their colleagues, and when working with children to support and extend their learning. They were also asked to rate their teaching skills in relation to using ICT. The responses are summarised in Table 5.4.

Table 5.4

*Rating of teacher skills and ICT*

<b>Rating of teaching skills</b>	<b>None</b>	<b>Novice</b>	<b>Emerging</b>	<b>Proficient</b>	<b>Accomplished</b>
When teaching adults / sharing knowledge with colleagues	0	0	2	1	0
When working with children/ supporting & extending learning	0	0	2	1	0
Overall teaching skills in relation to using ICT	0	0	2	1	0

When teachers are engaged in teaching both their colleagues and/or children, Angie and Celine identified their skills as emerging and Bridget identified her skills as proficient. Teachers were also asked to provide a rating of their overall teaching skills in relation to using ICT. A similar pattern was evident with Angie and Celine rating their skill as emerging and Bridget rating her skills as proficient.

Teachers were asked to indicate which statement best described their level of use of ICT for learning and teaching as shown in Table 5.5. Evident is that teachers within this kindergarten identify as having very different levels of expertise, across a continuum. Bridget, who indicated that she felt proficient with ICT identified that she was beginning to “integrate the unique capabilities of ICT into the programme”. Whereas Angie, who stated her level of ICT use was emerging, indicated that she was using ICT to “discover new and creative uses of ICT” in her teaching which was the highest point on the scale. On the other hand, Celine, who rating herself at the same level of expertise as Angie, actually placed herself at the midpoint on the rating scale “using ICT to extend the curriculum”.

Table 5.5

*Level of ICT use for learning and teaching*

<b>Level of use</b>	<b>Number</b>
Learning to use the ICT	0
Using the ICT to support my teaching	0
Using the ICT to extend the curriculum	1
Integrating the unique capabilities of ICT	1
Discovering new & creative uses of ICT in my teaching	1

Teachers were asked to rate their level of confidence in using ICT in their kindergarten. Celine identified herself as having adequate (n=1) level of confidence in using ICT. Angie suggested she had a good level of confidence (n=1) and Bridget very good (n=1). No teachers identified as having poor or excellent levels of confidence in the use of ICT in ECE. Of note here is that Celine had the highest

qualification but the lowest level of confidence. Whereas, Bridget had Equivalency (the least recognised qualification) but had the highest level of confidence. Both teachers indicated that they fitted into the same age category.

***Types of ICT use or planned use by children***

Teachers were asked to indicate from a list which types of ICT had been used (or were definitely planned for use) by the children attending the kindergarten in 2007.

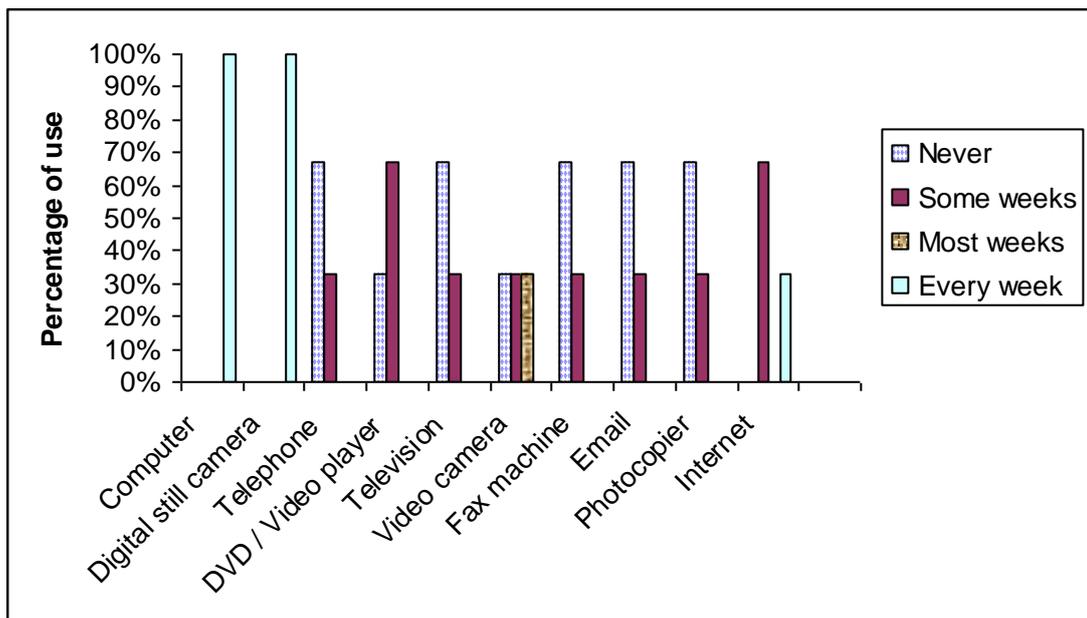


Figure 5.1. The use or planned use of ICT by children in 2007

Figure 5.1 summarises the “use” or “planned use” of ICT in the kindergarten environment. Of interest is the number and type of ICT resources that are never used with children. Of the ten ICT resources identified in the survey, children had access to only three on a weekly basis: the computer, digital still camera, and the internet.

Evidence suggests that teachers do not share a common perception of the types and number of ICT being used with children. For example, in eight of the ten categories teachers had conflicting views over the frequency that children engaged in the use of ICT.

The most frequently used pieces of ICT in the kindergarten setting by children were the KidDesk IBM computer and the digital camera. A laptop was also made available for the older children where they were able to view short video clips. Teachers were also asked to explain how they used (or planned to use) the most frequently used piece(s) of ICT. Teachers commented specifically that both the computer and the laptop are made available to the older children who attend the morning session.

Angie’s comment below is indicative of their responses.

*Morning session children have access to the camera to record interest and learning.*

The older children who attended the morning session had access to a wider range of ICT hardware. This increased access is often made available with the support and/or supervision of the teacher. While engaging with these technologies teachers reported that children may be involved in downloading photos, making e-books and searching the internet.

Teachers were asked to indicate how informed or knowledgeable they felt about the potential dangers of using ICT with young children and the wider safety issues surrounding its use. These potential dangers relate to children’s physical health and wellbeing, emotional safety and social competence. Table 5.6 highlights Celine and Bridget felt “informed” about these potential dangers and Angie was “not sure”. However, Celine and Bridget identified as being “informed” and Angie as “not well informed” of the wider safety issues concerning ICT use and children.

Table 5.6

*Kindergarten teachers’ knowledge of potential dangers of ICT use and young children*

<b>Informed &amp; knowledgeable</b>	<b>Not well informed</b>	<b>Not sure</b>	<b>Informed</b>
Potential dangers of using ICT with young children	0	1	2
Safety issues surrounding the use of ICT	1	0	2

Teachers were also asked to indicate if they talked with children about the safety issues surrounding the use of ICT. Results show that each teacher took a different approach to this issue. Bridget indicated that she discussed this issue regularly with children, Celine indicated that she occasionally discussed these issues and Angie suggested she did not engage children in discussion at all about the wider safety issues of using ICT.

### *Children's learning and ICT*

Teachers were asked to apply a ranking to the reasons why ICT is used within the kindergarten setting and the educational significance of this. Table 5.7 summarises their responses. The two reasons most highly reported for using ICT with children was “to develop their basic skills and computer literacy” (n=2) and “to encourage children to reflect on their own learning” (n=2). All teachers applied the lowest ranking to “encouraging children to become critical consumers” and “to develop skills for further jobs”.

Table 5.7

### *Teachers' reasons for ICT use in the kindergarten*

<b>Reason for use</b>	<b>Ranked</b>		
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>
To develop children's basic skills & computer literacy	1	1	0
To develop children's thinking & problem solving skills	0	0	1
To develop skills useful for further jobs	0	0	0
To develop social skills for collaboration & working with others	0	1	2
To encourage children to reflect on their own learning	2	1	0
To encourage children to become critical technology consumers	0	0	0
<b>Total</b>	<b>3</b>	<b>3</b>	<b>3</b>

Technological literacy is knowledge of what technology is and how it works; at a deeper level it also involves having knowledge of the role of technology in society. Overall this skill was ranked very highly by Celine and Bridget. It is interesting to note that while this skill was identified as important, teachers did not actually make reference to these skills when asked what learning was taking place when children were working at the computer. Bridget did make reference to children having the opportunity to use the mouse and keyboard, though both respondents spoke more generally about this topic. For example, Angie suggested:

*It's about having to wait for your turn. You also listen to other people's stories, other people's input, and you contribute to a project so everybody works towards the same goal....*

Bridget maintained that:

*There's also those manual dexterity things that are going on that they [the children] are learning like fine motor skills and hand-eye co-ordination. Learning to pay attention to what's happening, to listen to what's being said through the speakers. It's another place where turn taking happens.*

The above response may be an outcome of the holistic programme that is advocated in *Te Whāriki*. While these are all valuable skills for children to be developing it is noteworthy that teachers either shied away from, or were unable to articulate, the actual technological learning that may be taking place. Similar mixed messages came through in interviews with teachers who advocated the use of ICT by children but then raised concerns that its use was a more passive experience. The following comments from Bridget highlight her concerns:

*I guess in its passive way there are many opportunities for learning as there are in the other activities that children undertake.*

*I suppose there's an element of how much ICT do you want to have when there's so much hands on learning with the real matter and material. I mean you can debate this forever, how much do children need or not need equipment where they're sat at, because we all know it is not good for growing bodies that need lots of exercise...*

Teachers were also asked to apply a ranking to the level of the education sector in which they thought ICT was most important. Two teachers refused to answer the question as they felt that ICT was used quite differently in each sector and therefore was equally as important. In the follow-up interview Bridget stated:

*Because ICT is now used everywhere, and therefore the importance of it, I don't think can be regarded as any more important in one area than another. I mean it may be used differently in different sectors but it's just as important for each sector to have exposure, experience and become more proficient in the use of ICT, or have the opportunity to anyway.*

When respondents were asked to elaborate further Angie reported:

*I didn't want to rank the other ones before early childhood education because I just thought that was devaluing the experience the children have at pre-school.*

### ***Professional development***

Teachers were asked to indicate if they had attended any professional development courses on ICT in education. All kindergarten teachers indicated that they had engaged in professional development opportunities over the past two years. Teachers elaborated by stating that they were involved in an ICT cluster group and had also participated in professional development opportunities offered by their kindergarten association.

### ***Barriers to the integration of ICT***

Teachers were asked to apply a ranking order to the three main barriers inhibiting the successful use of ICT for learning and teaching. Table 5.8 provides an overview of the barriers identified as inhibiting the successful use of ICT for teaching and learning. All teachers identified one of the most significant barriers as the lack of teacher time. Both Celine and Angie also raised the cost of the equipment as an issue. No rankings were assigned to obsolete technology, lack of teacher interest, teacher understanding about the value of use, management/committee understanding about the value of use and teacher knowledge and philosophy about good teaching.

Table 5.8

*Barriers affecting the use of ICT in kindergarten*

<b>Barriers</b>	<b>Ranked</b>		
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>
Cost of the equipment	1	0	1
Lack of teacher time	0	3	0
Availability of the equipment	1	0	0
Teacher knowledge of the equipment	0	0	1
Cost and availability of technical support	1	0	1
<b>Total</b>	<b>3</b>	<b>3</b>	<b>3</b>

A further issue was raised by the teachers about the environmental set-up, accessibility and positioning of the ICT equipment. In the interviews, teachers discussed the possibility of setting up an ICT area in the kindergarten. They suggested that this would work better as there would be no issues with power points, cords, etc. All of the ICT in this area would be accessible to the older morning children.

*ICT framework for ECE*

Teachers were asked to indicate how familiar they were with the Ministry of Education's ICT policy developments in ECE. All of the kindergarten teachers indicated that they did not feel well informed at all about any policy developments in this area. This response is noteworthy since all teachers indicated that they had engaged in professional development opportunities during the previous two years.

*Summary*

Findings from Phase Two demonstrate that the perceived frequency of ICT use has increased during the past two years and all teachers identified their skills in the use of the equipment as emerging or proficient. Teachers' confidence and use of ICT in the learning and teaching programme was diverse. The questionnaires show that the kindergarten had access to a wide range of technology although children had access to only three items of ICT on a weekly basis. However, there were conflicting views evident over the types and frequency of use of these technologies. Wider access to ICT was made available to children who attended the morning session with support offered by the teachers. The development of basic computer literacy was identified as being a significant factor in the use of ICT in the kindergarten. However, when teachers were asked to articulate the types of things children could be learning when

working with ICT, they focused much more holistically and minimal attention was paid to what teachers described as “important skills”.

This case study reveals that all teachers participated in some form of professional development relating to ICT in the past two years. Although having participated in government funded professional development, teachers indicated that they did not feel well informed about the ICT framework for early childhood. Teachers also identified a number of issues affecting the integrated use of ICT, the extra time it takes to engage with the technology, cost of the equipment and the environmental set-up in the kindergarten (e.g., limited power points were raised as areas of concern). The next section elaborates further on the interviews conducted with the kindergarten teachers.

### *Teachers’ perceptions and practices*

In Phase Three, individual semi-structured interviews were conducted with two of the teachers in the kindergarten. Interview data are presented under the related research questions.

- What are teachers’ perceptions of using ICT with young children in the ECE settings?

#### *Teachers’ changing view of ICT*

Both teachers indicated that their role consisted of ensuring the equipment was used in a respectful manner (as it is expensive), introducing children to the possibilities of using ICT and to support and extend learning in this area. Teachers suggested that children needed to be taught specific skills to master the use of ICT. Bridget suggested that:

*... you need to know the technique and because children can’t read the manual and can’t read what’s on the button... there has to be that input from us. Also because this equipment happens to be valuable we have to ensure that it is handled in such a way that it’s not going to get damaged.*

The teachers acknowledged the importance of having established relationships with children. They suggested as an outcome of knowing the children well they are able to

provide an appropriate level of scaffolding for the children's learning across the curriculum. As Angie articulates in the following quote, sometimes this posed a challenge for teachers because of the cost involved in purchasing and maintaining the technology.

*... it is having to trust and stand back a bit too and not hover over them like a nervous aunty.*

The teachers were asked to consider how useful *Te Whāriki* (Ministry of Education, 1996) was in guiding the use of ICT in the kindergarten. Bridget indicated that the principles of empowerment, family and community, holistic development and relationships underpinned the experiences that were offered in the kindergarten. She said:

*...the principles, having children being able to use, ... those pieces of equipment it gives them independence and a sense of achievement. Children being able to take samples of their work home that relates to ... family, and community ... being able to share is all pervasive therefore holistic.*

The teachers indicated that because of the holistic nature of *Te Whāriki* (Ministry of Education, 1996) any of the strands could also be related to the use of ICT and its focus within the kindergarten. Bridget felt quite strongly that:

*Te Whāriki is a great document and we are lucky that we have it but it is great that it's not the curriculum prescribes.*

Teachers had quite high expectations of ICT in the early childhood environment. Notably, emphasis was placed on what ICT could do for children in their learning rather than what teachers can do with ICT to support children's learning. There appeared to be minimal acknowledgment of the role that the teacher might take when working alongside children. Bridget referred to the important role that ICT takes in facilitating the opportunity for children to be able to reflect on past experiences. This was often done through the use of photographs that had been provided as a form of assessment in children's portfolios.

She reports:

*I think that's great that they can use pieces of equipment [ICT] that give them immediate access to their experiences and revisit them. They demonstrate that in the joy that they have looking at their profiles and revisiting what's happening in a photo, or when you read to them. Hearing back again, what, what this particular experience is about. So I mean ICT really does facilitate that, I think ...*

As part of the assessment for learning teachers were asked whether they recorded children's learning stories (Ministry of Education, 2004a) with children in the main playroom. Angie said that while that idea had merit their teaching team often thought that this was teachers' work and should not be done during session hours. She stated:

*...when you're on the laptop with children, you think, I'm doing my profile work and I should do that at home in the small hours, do you know what I mean? You just feel like you're doing office work.*

Angie went on to say that the team had talked a lot about this mindset and that they needed to change this. The team were aware that at this point in time they still felt that it was acceptable to sit and read a book to children or to work with them in the sandpit; however, the acceptance of ICT as another learning area was still evolving.

Evidence suggests that for many teachers ICT is still viewed as a "new area" or an addition to the curriculum. A question was posed about how long it remained a "new area" and teachers acknowledged that it would be viewed as just another curriculum area when it becomes an integrated and accepted part of everyday practice. As Angie suggested this would occur in everyday supervision:

*...you start stopping off there [at the ICT area] or start being drawn there by children using it.*

Both Angie and Bridget discussed at some length the idea of establishing a separate ICT area for children to access. They indicated that because ICT was being used more often it was cumbersome to be setting up and putting away and a designated ICT area

would alleviate a lot of this. They also commented that children would become more familiar with ICT and its uses because it would be a permanent fixture just like other learning areas.

Evident in all of the interviews were concerns teachers had about the computer being a passive learning area, an area where children spent an exorbitant amount of time or worked in a solitary way. As an outcome of these concerns the kindergarten had introduced a range of strategies to guide the use of ICT by children. For example, teachers did not turn the computer on for use by children until part way through the morning session (10.00 am) and if children wanted a turn they were required to write their name on a list. Teachers also were cautious about how much ICT was used in the early childhood environment where active exploration, hands-on learning is what is valued. Bridget also voiced concern about children being so focused on the use of the equipment (ICT) that the opportunity to work and collaborate with peers was marginalised. She said:

*I mean I know kids have social interactions at the computer but it's not the same as being out and about, outside or inside, using their imagination or working together on a project. When children are using ICT they are more involved with the equipment than the people that may be around them. So it's not the same, it's different, an artificial group experience.*

This comment is noteworthy because while it shows that teachers are critiquing the use of ICT in their educational environments, it also reveals how their personal values and beliefs are influencing or mediating their practice, which in turn affects the curriculum offered.

Networking opportunities appeared to be highly valued in the kindergarten environment. Throughout the interviews the teachers referred to conferences they had attended where they had had the opportunity to see and hear other kindergartens' experiences of using ICT with young children. They also valued the opportunity to visit other kindergartens to view what was happening in their environments. The

teachers appreciated the opportunity to view these new initiatives and to engage in dialogue about the issues and merits of incorporating ICT in their kindergarten. Angie reported:

*It's just teeing up those places who are already where you want to be and to go and see how it works and how that would work for us and talk over some concerns.*

The above quote is an excellent example of teachers engaging in critical thinking when considering the forms of ICT they might offer and why. Angie stressed the importance of really talking with others before spending large amounts of money. She comments:

*You've got to figure things out and I want to really talk about it before we decide to go mad and buy things without really knowing what kind of impact they are going to have on our programme.*

A recurring theme throughout the interviews was the rules that surrounded the use of the equipment. Teachers stressed that ICT was expensive and therefore it required special rules about how it was used by children. While this approach could be considered valid, there is evidence that the rules may have overpowered the learning experience offered for children. Teachers suggested these special rules were necessary to ensure the careful use of ICT but, despite the rules, breakages had occurred.

### ***Linking with children's home lives***

Using ICT as a tool for reflection was a recurring thread during the interviews. As Bridget stated:

*People take them [the digital camera and toy kiwi] home and write stories and take photos ... so we get to see the photos of kiwi at the child's place, it's great. There are the profiles, which are a link [to the child's learning] and the children's stories are computer generated. Sometimes children have taken pieces of work home in photographic form that could not physically been transported [e.g. block constructions].*

However, when children brought their own ICT interests to the kindergarten, which often revolved around the computer, this was not always met positively. Some children spent sustained amounts of time at the computer and teachers did not view

this as healthy to forming relationships with others and for growing bodies. As an outcome teachers began to only make the computer available to children at ten o'clock in the morning in anticipation that they would begin to form relationships with others and not be so concerned about their turn.

As Angie stated:

*Children were close enough to see [inside] when it might be ten o'clock. As children physically got further away from the computer they started making connections with other children. When they made these connections they didn't care [about the computer]. They would still return to the computer and have a good turn every now and then but they were confident to go outside because they had a friend.*

The teachers were asked how they communicated to parents that children attending the morning session had access to ICT resources. Notably this was not an issue that was discussed with parents, as the teachers believed ICT was another experience that was offered to the older children alongside cooking and excursions. Parents regularly saw evidence of teachers using this technology, for example, through the children's portfolios, wall displays and slide shows of special events, and the teachers reported they had not questioned its use. Angie commented that:

*So I just assume that they [the parents] think oh well, I am sure those teachers know what they are doing. ... is it a sign of the trust they have in us.*

Teachers' perception of how parents felt about the use of ICT was repeated on a number of occasions. However, this always related to the completed product undertaken by the teacher. For example, the teachers referred to all forms of documentation and the fact that this could be shared and provide an insight for parents into what their child was engaged with in the kindergarten. At no point did the teachers talk about children's use of ICT, although Bridget did acknowledge that:

*...obviously there are an awful lot of parents who don't say anything but those who have, it has been positive.*

### *The ICT kindergarten experience*

This section explores the nature of the ICT learning experiences that children had access to in both their home and ECE setting. It addresses the research question:

- What is the nature of the ICT learning experiences young children have in the home and ECE settings?

There were a number of “special rules” around the use of technology with which children were very familiar and the teachers reported that children regularly reminded their peers of these. These rules relate to access, length of time and the respectful use of the resources. Peer tutoring is a strategy that is actively promoted in the kindergarten particularly with regards to ICT. Teachers reported that children are encouraged to support and assist one another with the range of technologies that are available.

The teachers were also exploring new approaches to using ICT. The most recent example was children beginning to understand and follow through with the process of taking a photograph and downloading the image and deciding how they might use it (e.g., printing out the photo or inserting it into PowerPoint and narrating it).

Teachers, in the context of promoting metacognition, often referred to the finished product. For example, photographs and e-books allowed children to reflect back when looking at these images and talk about past experiences, friends who used to attend kindergarten or previous visitors. Teachers report the use of visual images has also been a way that parents have engaged in the programme. Angie shared how this was occurring:

*...if the parents didn't come along [on the trip] then they get an idea of what the experience was for their child. The parent and child can look at the photos on the computer the child can recall their experience and, talk about, you know, who's in the photo and what they did next ...*

Teachers also talked about the e-books that they had been making with children. This was linked to the idea of visual literacy as children told a story about their photograph. What was interesting was that the participants stressed that this activity

could be teacher orientated, and Angie suggested it was not used instead of books, as it was “an as well as” activity. This may be an example of teachers’ reluctance to ‘educationalise’ ECE.

### *Issues and challenges*

Teachers were asked to highlight barriers that inhibit the successful incorporation of ICT in the educational programme. This section explores the question:

- What issues, real or potential, do parents and teachers perceive with the introduction of ICT into ECE settings?

As indicated earlier the most common barriers identified by two of the kindergarten teachers was the lack of teacher time and the cost of the equipment. Angie expanded on this theme by identifying the importance of:

*...not allowing the busyness of the day to crowd you in and stop you from going any further [with the ICT experience].*

Broken equipment was a recurrent issue and teachers reported that this limited children being “allowed” to use the equipment. Funding for the ICT was seen as a major challenge for kindergartens. Teachers drew comparisons to other resources in the kindergarten and how easy and cheaply they could continually be restocked and replenished. As Angie stated:

*...If you go to the \$2.00 shop you can spend ten dollars on knives for playdough and purchase dress ups from the op shop. You can keep replenishing those resources relatively cheaply... But when it comes to ICT [equipment] you want quality stuff and you are talking a higher price.*

The teaching team indicated that because of the high cost of ICT they had taken on a more active role in applying for grants to specifically fund equipment for their kindergarten. Angie stated:

*... we thought, perhaps, we might take over the ICT grant applications. So then we can fire them off, because they [committee] have got other things to concern themselves with.*

As previously reported there were a number of issues regarding the environmental set up, the accessibility and positioning of equipment. The lack of space, power points, internet access (usually only available in the office) and trailing power cords were also identified as areas of concern. The lack of technical support was also an issue for the kindergarten as if something broke down teachers had to approach a sympathetic, knowledgeable parent to repair the item. The lack of technical support was also an issue when purchasing equipment and, in some instances, resulted in causing ongoing issues for the teachers.

They reported:

*Like when we brought our Panasonic camera, I had no idea that it wouldn't take photos in a form that you could use for movie making and now that I know that I certainly would not have brought it. (Angie)*

*...So we are currently getting a parent who's looking around for some software so we can convert the files. (Bridget)*

### *Summary*

Teachers highlighted the importance of having established relationships with children in order to make informed decisions about the extension of children's learning across the curriculum inclusive of ICT. *Te Whāriki* was identified as a guiding document in the integration of ICT into a holistic curriculum and while this underpinned teachers' practice, it did not appear to be used as the front frame when considering ICT use. Teachers were reflective of their underlying beliefs of ICT and have engaged in some discussion of these and how they influence the learning programme offered. However, these beliefs (both implicit and explicit) were still strongly evident throughout the interviews in mediating their practice. Their beliefs appeared to be shaped by a personal struggle between the importance of basic technology skills and a new moral panic focused on and around the computer being passive, a solitary learning experience and a sedentary activity. A number of barriers to ICT use were both identified in the survey and reiterated in the interviews. These barriers include, but are not limited to, issues with time, cost of the equipment and technical support.

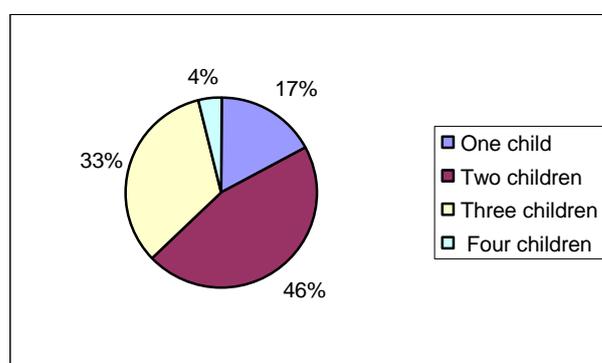
### *Parent surveys*

In the second phase of the research, all parents and caregivers of children currently attending the kindergarten were invited to complete a questionnaire seeking data on their perceptions and of using ICT with young children. Ninety parent questionnaires were made available to the kindergarten and 24 were returned, a response rate of 27%.

#### *A review of the participant information*

Parents were asked to indicate their relationship to the child who attended kindergarten. Twenty-one mothers completed these questionnaires and four fathers; however, in some instances, both parents completed the questionnaire together. Information regarding ethnicity was also sought from participants with the largest group (88%) identifying themselves as Pakeha/European. A further 4% of participants identified themselves as Māori, Asian or other. An indication of age was also sought from participants. Three parents indicated they fitted into the 20-29 category, 12 parents were aged between 30 and 39 and a further nine parents indicated that their age range was between 40 and 49 years. All parents had completed secondary school with a qualification and a further 46% indicated that they now held other qualifications. Data about the number of the children under 16 years of age living in the household were also sought and is illustrated in Figure 5.2.

*Figure 5.2.* Number of children under 16 living in the household



Forty six percent of families had two children and 33% had three children under the age of 16 living at home. Families with four children living at home formed the smallest group of respondents (4%).

### *Nature of the ICT learning experience*

In Phase Two the questionnaires sought information from parents about the level of access to ICT that was available in the home environment. In this section data are reported in relation to the following research question:

- What is the nature of the ICT learning experiences young children have in the home and ECE settings?

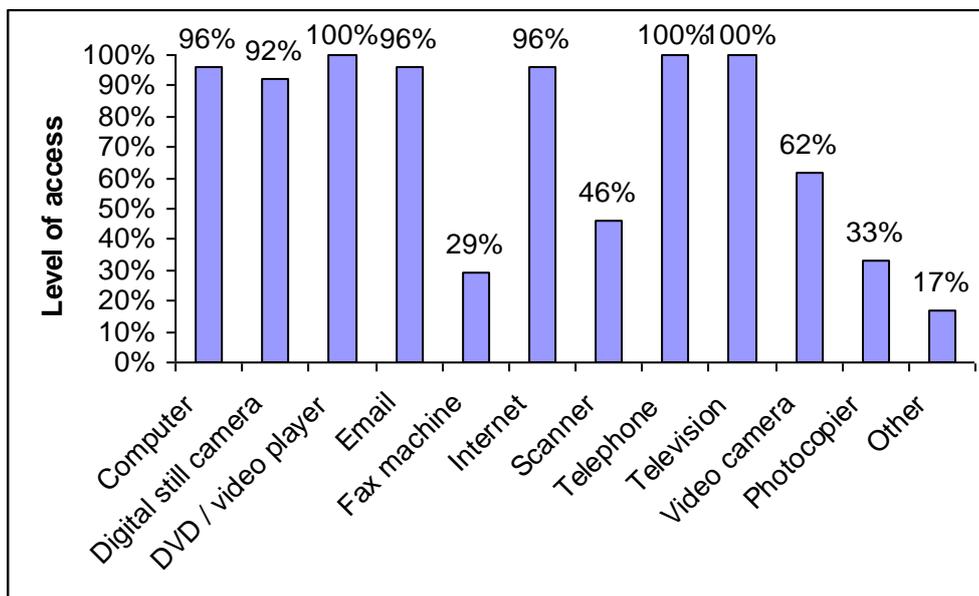


Figure 5.3. The level of ICT access available in the home environment

As illustrated in Figure 5.3 all families indicated that they had access to televisions, DVD/video players and telephones. A high percentage of families (96%) also had access to a computer, the internet and email. Families were least likely to have access to a fax machine or photocopier. A further four families indicated that they had access to “other” forms of ICT which included MP3 players, webcams and mobile phones with multimedia capabilities.

Information about access to the internet was also sought from parents. The results show that broadband is the preferred type of access (71%). Dial-up access is used by

four of the parents and wireless appears to still be in its early infancy with only two families indicating they had this type of access. One family had no internet access (and no computer) at all.

Parents were asked to indicate which forms of ICT were available for their child to use and where it was made available. All respondents reported that children had access to a television and DVD/video player in the living room and a further six children had access to a television and video / DVD (n=5) in their own or parent's bedrooms, as shown in Table 5.9. A large percentage of children had access to mobile devices, for example, telephones, digital cameras and videos; however, the place of access was more difficult to gauge because of the portability of these forms of technology. In a number of cases, similar forms of ICT equipment were available for children to use in different areas of the home, for example, computers were available in the living room, rumpus room, study and/or office. Children were least likely to have access to a video camera, a playstation or a scanner.

Table 5.9

*ICT available for children's use and place of access*

	Living room	Bedroom	Other	No access
Computer	8	1	12	0
Scanner	1	0	3	0
Digital camera	5	1	7	0
Telephone	19	5	6	0
Television	24	6	1	0
DVD / video player	24	5	1	0
Video camera	3	0	3	0
Internet	7	0	10	0
Playstation / Xbox	7	0	1	0
Cellphone & other mobile devices	5	2	6	0

Figure 5.4 provides an overview of how often the kindergarten child was able to access the computer in the home setting. While six children were able to access the computer on a weekly basis, a further seven children had no access available to them in the home. Parents who did allow children access, were asked how much time their child had spent on the computer in the past week. More than half of the parents (n=15) indicated that their child had used the computer for less than one and a half hours in the previous week. One parent identified that their child had used the computer for between five and ten hours. Information about how much time children spent on the internet was also sought. Data shows that sixteen children had spent between one and five hours on the internet in the previous week and a further eight parents stated that their child did not access the internet at all.

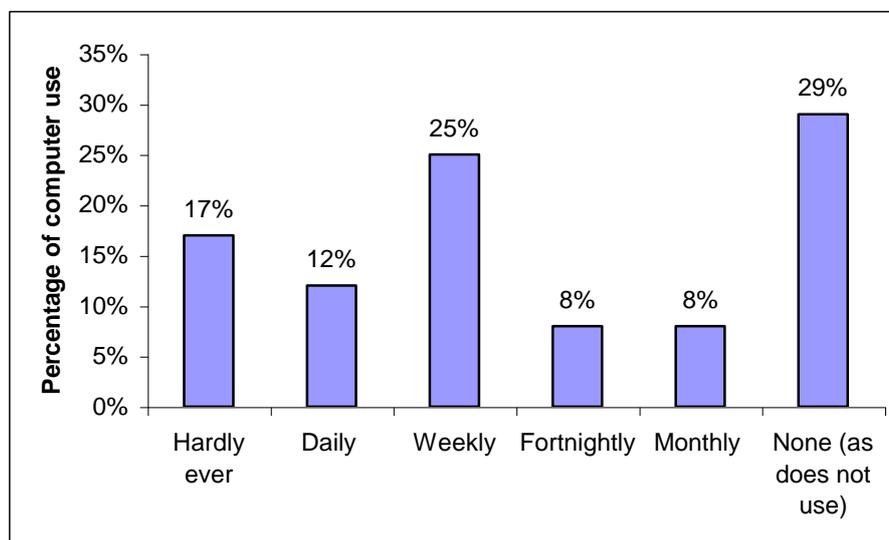


Figure 5.4. Frequency of child’s computer use in the home setting

Activities that children engaged in when using the computer in the home setting are shown in Figure 5.5. Using CD ROMs to play games was the most frequent activity children engaged in when working with the computer (46%). Parents cited “other” as the next frequent area of use by children and this included using websites, internet games and skype to talk with family members overseas.

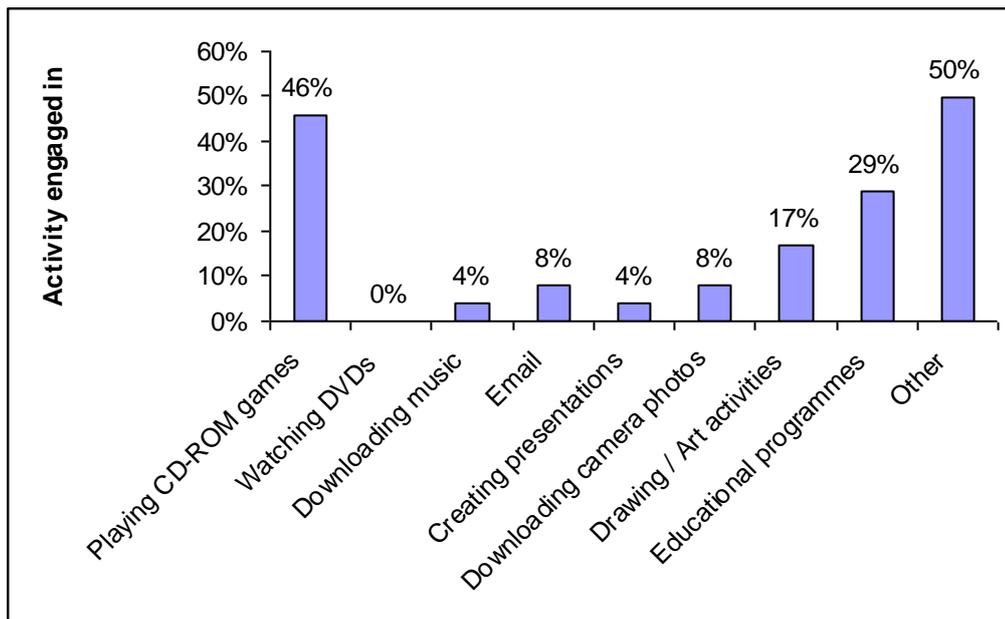


Figure 5.5. Computer use and activities child engaged in

Parents were asked to provide some examples of their child's favourite activity on the computer. Responses included:

*Using Skype to talk to Dad when he is overseas.*

*Internet games, e.g., Bratz and Barbie websites. Playing her My Little Pony CD Rom and visiting the Bratz site and playing games on it.*

The level of parental concern was explored with regard to what children were actually doing when they were using the computer. More than half of the respondents (n=14) indicated that they were not concerned at all. Five of the parents indicated that they were somewhat concerned, with a further three families suggesting that they were very concerned. Parents were asked to elaborate on how they supervised and/or regulated the use of the computer by their children. Nine parents indicated that they sat with their children to monitor use at the computer. Eight families also commented that they checked on their children's use regularly and had a number of rules with regards to the use of the computer.

The following examples show these rules:

*By trying to be there to supervise. It is not always possible to watch 100% but we endeavour to keep our eye on what she is doing. Regulate – make rules, use [the computer] for quiet time at the end of the day.*

*Set time limits. [We are] able to hear what they are doing and check at regular intervals.*

### ***Parental perception of computer use***

In this section data are reported in relation to the following research question:

- What are parents' perceptions of young children using ICT in the home and ECE settings?

Table 5.10 demonstrates that while ten parents believed it is essential their children learn with and through these new technologies, only eight parents indicated that they thought children learnt through having access to a computer in their home environment. Half of the parents believed that it was necessary for children to have access to ICT. Of interest is the number of parents who partly agreed or remained unsure of any potential benefits that these technologies might have to children's learning.

Table 5.10

#### *Parental views of computers in the home environment*

<b>Parental view</b>	<b>Agree</b>	<b>Partly agree</b>	<b>Not sure</b>	<b>Disagree</b>
The ability to use new technology is essential to young children's learning	10	8	2	3
Children learn so much through having a computer in the home	8	11	2	3
Children do not require access to these technologies	3	6	4	12

Table 5.11 shows that more than half of the parents (54%) thought that every early childhood centre should have access to ICT resources and computers were seen as one of these resources by eight of respondents. What is interesting to note is the high proportion of parents who are “unsure” or do not have a definite opinion regarding the use of ICT and young children. Parents agreed or partly agreed with the statement that the money used to fund computers in the early childhood environment could be better spent on other equipment (n = 41%) and ten parents indicated that children did not require access to ICT under five years of age.

Table 5.11

*Parental views of the use of ICT by children in ECE*

<b>Parental view</b>	<b>Agree</b>	<b>Partly agree</b>	<b>Not sure</b>	<b>Disagree</b>
Every EC centre should have access to these resources	13	7	1	3
Computers are an essential part of the ECE experience	8	9	1	6
The money spent on computers could be better spent on other equipment	3	7	6	8
Children do not need access to computer technology under five years of age	5	7	2	10

*What is the perceived value of using ICT in ECE?*

Parents were also asked to apply a ranking to which level of the education sector they thought ICT was most important. One parent refused to answer the question, as they believed that ICT was of equal importance across the different educational levels for quite different reasons. A second parent ranked all categories equally stating that they were all the same, this response is not included in table 5.12.

Table 5.12

*Where is ICT most important in the education sector?*

Education sector	Ranked			
	1st	2nd	3rd	4th
Early childhood education	1	0	1	20
Primary education	3	5	13	1
Secondary education	12	9	1	0
Tertiary education	6	8	7	1
Total number	22	22	22	22

Table 5.12 shows that more than half of the parents (n=12) indicated that they thought ICT was most important at secondary education level, followed by the tertiary level (n=6). A large number of parents (n=20) indicated that the use of ICT was least important in the ECE sector. In follow-up comments, parents made reference to the fact that secondary school pupils would be using ICT skills in further employment and ongoing education and, therefore, they were of the utmost significance at this time. Comments included:

*Secondary because from here lots of children leave for employment so recent familiarity with ICT is very relevant...*

*Because ICT is critical for tertiary education, some of these courses are only available via ICT.*

Reference to learning the basics first was made by seven of the parents who stressed that children would be exposed to these technologies soon enough and that they felt it important that they learnt about literacy, numeracy and relating to others first. Parents suggested that:

*It is important for younger children to develop social and writing skills first.*

*...ICT is of minimal importance because they [children] need time to learn through play and socialisation.*

*[Children] learn to read and write before they learn to use a computer.*

Two parents indicated in their responses that they believed that ICT was of significance in the kindergarten setting. However, one of these responses ranked ECE as being least important when compared to other sectors of education. They stated:

*The earlier you start the better.*

*The earlier exposure the more informed the children will be.*

### ***The safe use of ICT with young children***

Parents were asked how knowledgeable or informed they felt about the potential dangers relating to children's physical health, emotional safety and social competence when using ICT with young children. Notably, 16 indicated that they felt "informed" or "very informed". A further seven indicated that they did not feel "well informed" or were "not sure".

A number of parents expressed concerns and the following two statements are typical of their responses:

*I am concerned mainly about my ability to teach my children about the dangers and their ability to identify when they are being manipulated or what is actually a nasty experience on the internet.*

*I love to see children outside playing and doing things children should do, role playing etc. I am concerned our children are growing up too early and believe children need lots of physical activity. I fear children will become couch potatoes and lazy.*

### ***Children's use of ICT and parental concern***

An image from a recent New Zealand advertisement that showed a child using technology was used as a prompt with parents. They were asked how concerned they were about their child using this technology in the future. Table 5.13 demonstrates that more than half of the parents (58%) expressed no concern about their children using these technologies in the future. However, a further 37% of parents indicated that they were "not sure" or had some level of concern over this, with one parent suggesting they were very concerned.

Table 5.13

*Concern about the future use of ICT*

<b>Level of concern</b>	<b>Number</b>
Not concerned at all	14
Not sure	1
A little concerned	3
Somewhat concerned	5
Very concerned	1

Many parents provided informative comments about their view of ICT and the concerns that they have. These included:

*I think there is an appropriate age to begin the using this technology e.g., at school. Children learn and develop skills through play under the age of five. It is more important that they practise their pre-writing skills such as painting, drawing, playdough and handcraft based activities. Computer play is anti-social.*

*I feel society demands that children are equipped to use these technologies the computer is a powerful learning tool and an extension of books.*

*All this technology is just another thing like a Piano, bike, garden fork or hose. It is stuff they [the children] learn about and is useful for living a productive and enjoyable life. I am not concerned at all about this.*

***Why use ICT in ECE?***

Parents were asked to apply a ranking to the reasons why ICT is used within the kindergarten setting. Table 5.14 summarises parents' responses regarding the most important reasons for using ICT and its educational significance. The two reasons most highly reported were to develop children's basic skills and computer literacy (n=13) and to develop children's thinking and problem solving skills (n=12). Of

interest are the cluster of responses that indicated many parents remained undecided as to whether ICT was used to “develop social skills for collaboration and working with others” or “to encourage children to reflect on their own learning”. The lowest rankings were applied to using ICT to encourage critical technology consumers (n=17) and for children to develop skills for further jobs (n=14). Two responses were excluded from this analysis as they ranked all categories second equal.

Table 5.14

*Parents’ reasons for ICT use in the kindergarten*

<b>Reason for use</b>	<b>Ranked</b>		
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>
To develop children’s basic skills & computer literacy	13	4	2
To develop children’s thinking & problem solving skills	7	12	1
To develop skills useful for further jobs	1	2	2
To develop social skills for collaboration & working with others	1	3	5
To encourage children to reflect their own learning	0	0	10
To encourage children to become critical technology consumers	0	1	2
Total number	22	22	22

*Summary*

This section has established that children have access to a range of technologies in the home environment with a large majority of children accessing the computer for less than one and a half hours per week. When using a computer children most frequently engaged in using CD-Roms and playing educational games on the computer. Parents suggested that because of the age of their children (3 – 5 years) a high level of supervision was offered when they worked on the computer. As an outcome more than half of the parents indicated that they were not concerned about their child’s computer use. While a large number of parents suggested that they felt informed about the wider issues associated with children using the computer, and ICT more generally, there was evidence of a group of parents (n=7) who did not feel well informed.

The data gathered showed evidence that many parents remained unsure about the potential learning opportunities afforded through the use of ICT in the home setting. This view was reflected in the group of parents who were unsure, or who had no definite opinion about, whether children should have access to ICT in ECE. Parents identified that if ICT is used in ECE then it should assist in developing children's basic computer literacy, problem solving and thinking skills. A noteworthy theme to emerge through the data was that parents seemed unsure whether ICT was useful in assisting children to further develop their social skills for collaboration and working together and in reflecting on their own learning. Parents also showed through their responses that they believed ICT was most important in the secondary sector and ECE was of least importance.

### *Children's perceptions of ICT*

In Phase Three, individual interviews were conducted with four children; selection criteria included gender and level of ICT use. Note that all names used are fictitious. The research question guiding these interviews was:

- What are children's perceptions of using ICT in the home and ECE settings?

#### *Interviews with children*

In the individual interviews children were asked to share information about their home and kindergarten use of ICT. During these conversations children referred to their favourite websites and uses of the technology, which often related to using a computer. They also shared their frustrations with not having access to a printer or a printer being out of ink. It very quickly became evident that some of these children were knowledgeable users of the technology that they had in their homes. For example, Andrew explained the process of printing out a picture from the computer.

*There's a picture of a printer and I just click on that and then I click OK and then it prints. But I have to stand on the computer chair and if it's off I switch it on.*

In the kindergarten setting children had access to a range of ICT experiences, these included working at the KidDesk computer accessing preloaded software, using the

digital camera, watching a slideshow of photographs on the laptop and, on occasion, working alongside the teachers to download images into the computer to create an e-book together. Photographs of ICT equipment were used as a stimulus in the interviews in order to encourage the discussion around the available technology and the children's use in the kindergarten. The following extract shows the children's understanding of the technology and the processes associated with its use.

Andrew talks about the process involved in using the computer and changing the preloaded software from one game to another.

Researcher: *Can you tell me what's happening in this photo?*

Andrew: *I am using the computer.*

Researcher: *Can you remember what game you were playing there?*

Andrew: *...I was just changing it to that desk. See that desk (pointing to the computer) I was just changing it to that desk.*

What became apparent was that the selected children had a very clear understanding about the rules surrounding the use of the ICT in both their home lives and in the kindergarten setting. They talked at some length about the importance of the name chart and name cards that were used to monitor whose turn it was to work at the computer. The children confidently articulated the process involved in this.



Figure 5.6. Name chart

Cheryl explained this process.

Cheryl: *You write your name or stick your name thing on (name card).*

Researcher: *Does that show others when it is your turn?*

Cheryl: *Yeah and you have a cloth to wipe out your name.*

Andrew suggested that:

*Someone has to put their name on it and then they get their turn what number it's on. I put my name there (pointing to the top of the list).*

Children were asked who turned the computer on and off at kindergarten and they shared that the teacher was the only person allowed to do so. A question was asked as to how the children knew when their time was up on the computer and the children said that the teacher would tell them. This point is illustrated in the following conversation:

Researcher: *How do you know when your turn has finished on the computer?*

Daryl: *They [the teachers] tell you to get off the seat and have morning tea after they have had a turn on the computer.*

Rules surrounding the use of the ICT equipment in the kindergarten and children's use were explored and what became apparent was that they were also very knowledgeable about these. Andrew talked about the digital camera and the importance of putting the strap around your neck and walking with it on a flat surface and the importance of "not smashing it". Children talked about the laptop that was made available to watch short video clips (of the kindergarten children or to build on children's interests). As one child reports:



Figure 5.7. Use of the laptop

Brenda explained the purpose of specific computers.

Researcher: *What do you do on this computer?*

Brenda: *No you don't do on that computer cause that one shows you pictures.*

Researcher: *Are they the photographs that the teachers have taken? (Child nods her head). And do you sometimes look at those photographs?*

Brenda: *(Nods head) and you don't touch the buttons on there.*

Researcher: *So you don't touch that computer you just look at it?*

Andrew reiterated this message:

*They [the teachers] turn the computer [laptop] on and the kids can look at the photos whenever they want.*

Children clearly had exposure to ICT and had a great deal of knowledge around the rules that surrounded its use in the kindergarten. Through looking at the photographs and engaging in the drawing activity, children talked about the various components of the ICT available and their purpose.

Brenda draws a computer and comments:

Brenda: *...now let's see the computer is a square. I'm going to write the letter A and a big H and another big letter. Do you know what, this is actually the kindy's computer but I don't do the mouse.*

Researcher: *I wonder, do you know what the mouse does?*

Brenda: *They let you click stuff and do stuff; now I need to draw on an arrow.*

Researcher: *What does the arrow let you do?*

Brenda: *It lets you follow the mouse. (Child draws a person standing behind the computer). She is real mad at him cause he is using the wrong computer. He knows the website on the internet for that one it's [www.com](http://www.com).*

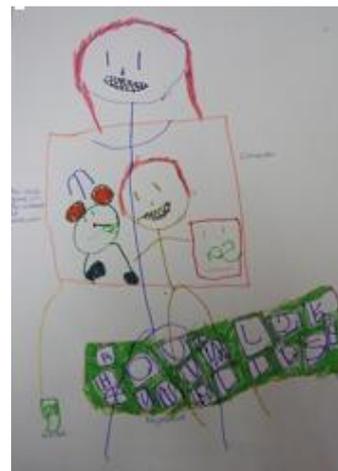


Figure 5.8. Components of the computer

This child had talked at length about the rules relating to ICT in both her home and the kindergarten environment. She had identified which technology the children were allowed to access and how it could be used. During the focus of these conversations many of the children identified the various parts and functions of the technology.

A child chose to draw a picture of a digital camera and when doing so he spoke about the neck strap and the importance of using it to ensure that the camera was kept safe. He talked about the 'on' button and the lens of the camera. This child stressed the importance of not touching the lens and suggested this was because things might get blurry. He also made connections to his home life and the use of the digital camera there by him. During a number of the interviews children shared their knowledge of how photos are downloaded into the computer. The data shows that these children were unclear of this process as shown in the following excerpts.

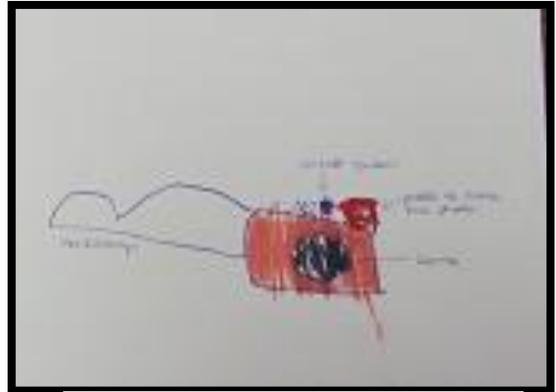


Figure 5.9. A digital camera

Researcher: *I wonder, how do you get the photos off the camera?*

Brenda: *No you just leave it like that.*

Researcher: *You leave the photos on the camera? I wonder, how do you get photos to look like that? (Printed photos)*

Brenda: *You push the buttons.*

Researcher: *You push which buttons.*

Brenda: *On that (points to a printer), on daddy's one.*

Daryl also shared his perspective.

Researcher: *I wonder, how do you get the photos off the camera?*

Daryl: *Um, they don't.*

Researcher: *They don't, do they stay on the camera?*

Daryl: *Yeah.*

Researcher: *Do they get printed out?*

Daryl: *No, they stay on the camera.*

### *Summary*

In summary, this section has shown that children's interest in ICT includes wider peripheral devices such as a printer and some frustration is expressed when access is unavailable. A developing understanding of the ICT equipment and the functions that they perform was also evident in the interviews. Children's use of ICT also incorporates the internet and children stated clearly their favourite activities or websites when using it. Rules surrounding the routine and the use of ICT in the both the home and kindergarten environment were clearly articulated by children in some depth.

### ***Interpretive summary***

#### *The nervous aunts and ICT*

This chapter has provided detailed information from a case study of teachers', children's and parents' perceptions and practices of the use of ICT in a single kindergarten setting.

This case study highlighted that the confident and competent use of ICT related more to the teacher's interest than to their level of qualification. The analysis has shown that one teacher's expertise and knowledge of ICT was at a higher level than her co-workers, which enabled some scaffolding of knowledge to occur. All teachers had participated in ICT professional development and were actively looking for opportunities in their local communities where they could network and build on their emerging skills and knowledge. Although having had participated in professional development opportunities these teachers acknowledged that they had a limited understanding of the Ministry of Education's policy framework *Foundations for Discovery* (2005). Coupled with an acknowledgment that ICT could be related to *Te Whāriki*, dependent on how it was used, would indicate that ICT in this instance is fitted into the curriculum rather than the curriculum (or ICT framework) guiding its use.

A number of ongoing issues with the use of ICT in this kindergarten were also raised. The environmental set up was one of these issues and teachers were considering offering ICT in a designated area. This was being considered for safety reasons (e.g., electric wall sockets, trailing cords) and to offer ICT as a regular aspect of the curriculum. A planned visit to see this approach in action in another kindergarten was mooted and teachers indicated they would then discuss any possible merits or pitfalls. While this approach demonstrates that teachers are engaging in critical thinking this 'designated area' does alienate the use of ICT. As discussed in the literature review a more recent approach is to look for opportunities to integrate ICT across the curriculum. Offering ICT in a designated space means that children have to go to the ICT rather than the ICT being used to extend children's learning. As Yelland (2005) suggests, ICT in this manner becomes more of an "add on" to the programme of learning, rather than an integrated component.

As stated, the funding of these ICT resources was also an issue and teachers in this kindergarten were taking a proactive approach by actively leading the process of applying for grants. Teachers were strong advocates for the use of ICT in the kindergarten and while good intentions were evident this approach was assigning a high status to the resourcing of this equipment. What is noteworthy is that although ICT was valued and promoted in the kindergarten, teachers did not speak with parents about their children's use of this resource. Artefacts created through ICT were used to share information with parents about their child's engagement in the programme (e.g., learning stories, videos) but the use of ICT by young children was not discussed. Teachers suggested that parents trusted their judgement and while this may be true the data does show that parents themselves remained unsure of any potential benefits of their children being exposed to, or using, these technologies. While most parents agreed that ECE should have access to ICT resources they remained unsure of why. This resulted in a large percentage of parents stating that the money spent on ICT in this kindergarten could be better spent elsewhere.

Teachers themselves struggled to articulate the possible benefits of ICT use and in the analysis there is evidence of moral panic occurring. For teachers offering ICT in the programme was similar to walking a tightrope, as they had to carefully balance the

right level and amount of time dedicated to its use. As one participant stated it was challenging not to act like “a nervous aunty” when children used these expensive resources. This approach resulted in a repertoire of rules that surrounded the use of ICT and at times overshadowed its purpose. Children very clearly could discuss the rules and routines surrounding the use of ICT and when and how they may be able to access it.

Periods of access were restricted as teachers struggled to come to terms with ICT being another learning experience. This was particularly evident at the children’s computer with preloaded educational software. Data suggests that teachers are experiencing a personal struggle about how to offer ICT in their programme of learning that does not conflict with their values and beliefs of what is appropriate learning for children.

Running parallel to this moral panic was a relinquishing of the teachers’ role and an emphasis being placed on what ICT could do for children. The literature review stresses that a distinguishing feature of the ‘second wave’ of ICT in ECE is the importance of pedagogy and the key role of the teacher and yet this was not strongly evident in the data.

Finally, there was some general agreement by parents and teachers regarding the reasons for using ICT in the kindergarten. One of the most highly cited reasons by parents and teachers was to “encourage children to reflect on their own learning”. This was evidenced throughout the interviews where teachers talked at length about using ICT and artefacts created through it to encourage children to talk about past experiences. Teachers have promoted a multi-modal ways of composing text, accessing and reviewing information with children.

The following chapter is an analysis of the data gathered in the education and care centre. It describes the results from Phase Two and Three, which involved teachers, parents and children in a single centre setting.

## CHAPTER SIX

### Case study of an Education and Care Centre

This chapter reports the findings of a case study of a single Education and Care Centre. Phase One of this research sought to identify information about the level and type of use of ICT in ECE services. From the wider population involved in this survey a purposive sample of two early childhood service types located in a specific geographical area were selected on the basis of integrating at least two pieces of ICT into their educational programme.

The purpose of Phases Two and Three was to ascertain information about teachers', parents' and children's perceptions and practices of using ICT in these ECE centres. Phase Two involved all the teachers employed in the selected early childhood centre (n=7), and the parents of the children attending this centre being invited to complete a questionnaire (see Appendices 9 and 11). Four of the seven teachers employed (57%) and six of the families (13%) from this centre responded to the questionnaire.

In Phase Three, teachers (n=3) and a group of children who were selected based on gender and level of technology experience (which was a convenience sample) were involved in individual interviews.

The first set of results relate to the data drawn from the questionnaire sent to all of the teaching team. Note that all teachers have been assigned fictitious names to protect their identities.

#### *Teacher's background data*

The number of teachers employed in this centre was seven, of which five were employed full-time and two part-time. These teachers were all female and all indicated that they were aged between 20-29 years. Table 6.1 provides an overview of the teachers' qualifications, their level of teaching experience, any internet access and professional development. Two of the teachers held a Bachelors degree in Education and another was in the final stages of completing a Bachelors degree in Education. Eva did not have a teaching qualification but did hold a Bachelors degree in Biology.

Table 6.1

*Background data on the teachers*

<b>Teacher</b>	<b>Qualification</b>	<b>Studying towards</b>	<b>Experience ECE</b>	<b>Professional development</b>	<b>Internet access</b>
Daisy	Bachelor of Teaching (ECE)		10 years	No	Broadband
Georgia	Bachelor of Teaching (ECE)		3 years	No	Dial up
Eva	BA Biology		3 months	No	None
Frankie		Bachelor of Teaching (ECE)	4 years	Yes	Broadband

The teachers were asked to comment on their personal ICT experiences. All of them (n=4) reported that they had access to a home computer. Three had access to the internet and were asked what type of access they had at home. Responses varied widely; Georgia had dial up access, Daisy and Frankie had broadband access.

Teachers were asked to identify how long they had worked in the ECE field and had held their current position. Table 6.2 shows that teachers had spent an average of 18 months in their current position and had taught in the ECE sector for a median of just over three years.

Table 6.2

*Level of teaching experience*

<b>Teaching experience in years</b>	<b>Mean</b>	<b>Median</b>	<b>Range</b>
Worked in ECE	4.3	3.2	9.9
Current position	1.6	1.5	2.9

*Teachers' use of ICT in the Education and Care Centre*

Teachers were asked to indicate how their level of use of ICT had changed, if at all, over the past two years. Table 6.3 demonstrates that the perceived frequency of ICT

use has increased substantially over the past two years. ICT that was identified as having increased in use included the internet, the DVD/video player and the fax. Half of the teachers indicated that ICT was being used “more” or “much more frequently”. Television had the biggest decline in use (25%).

Table 6.3

*Frequency of use*

<b>Type of ICT</b>	<b>Much less</b>	<b>Less</b>	<b>Same</b>	<b>More</b>	<b>Much more</b>
Computer	0	0	2	1	1
Digital camera	0	0	1	1	1
Video camera	0	0	1	1	1
Internet	0	0	1	2	1
Computer software	0	1	1	1	1
Television	1	0	2	1	0
DVD / Video player	0	0	2	2	0
Fax	0	0	2	2	0
Email	0	0	3	0	1

Teachers were asked to rate their technical skills in relation to using ICT when teaching adults or sharing their knowledge with their colleagues, and when working with children to supporting and extending their learning. The responses are summarised in Table 6.4.

Table 6.4

*Rating of teacher skills and ICT*

<b>Rating of technical skills</b>	<b>None</b>	<b>Novice</b>	<b>Emerging</b>	<b>Proficient</b>	<b>Accomplished</b>
When teaching adults / sharing knowledge with colleagues	0	0	1	3	0
When working with children / supporting & extending learning	0	0	3	1	0
Overall teaching skills in relation to using ICT	0	0	2	2	0

When teaching adults, about ICT Daisy, Eva and Frankie identified their skills as proficient and Georgia identified her skills as emerging. However, when working with children to support and extend their learning, three teachers indicated that their skills were still emerging with Eva identifying herself as being proficient. This is noteworthy, as Eva was the unqualified ECE teacher who had worked for the shortest period of time in the ECE Centre. Teachers were also asked to provide a rating of their overall teaching skills in relation to using ICT. Eva and Georgia indicated that their skills were emerging and Daisy and Frankie identified their skills as proficient.

Teachers were asked to indicate which statement best described their level of use of ICT for learning and teaching as shown in Table 6.5. Evident is that teachers within this centre identify as having very different levels of expertise, across a continuum. Eva, who identified as being proficient when working with ICT and children indicated that she was using ICT “to support her own teaching”. Whereas, Georgia, who had indicated that her skills were emerging, identified that she was “integrating the unique capabilities of ICT into the curriculum”.

Table 6.5

*Level of ICT use for learning and teaching*

<b>Level of use</b>	<b>Number</b>
Learning to use the ICT	0
Using ICT to support my teaching	2
Using ICT to extend the curriculum	1
Integrating the unique capabilities of ICT	1
Discovering new & creative uses of ICT in my teaching	0

Teachers were asked to rate their level of confidence in using ICT in their ECE centre. Daisy and Eva identified themselves as having a “good” level of confidence and Georgia and Frankie stated their level of confidence was “very good” in using ICT in teaching and learning. Of note here is that both Georgia and Frankie had internet access in the home and had been teaching for similar periods of time (e.g., between three and four years).

### *Types of ICT use or planned use by children*

Teachers were asked to indicate from a list which types of ICT had been used (or were definitely planned for use) by the children attending the ECE centre in 2007.

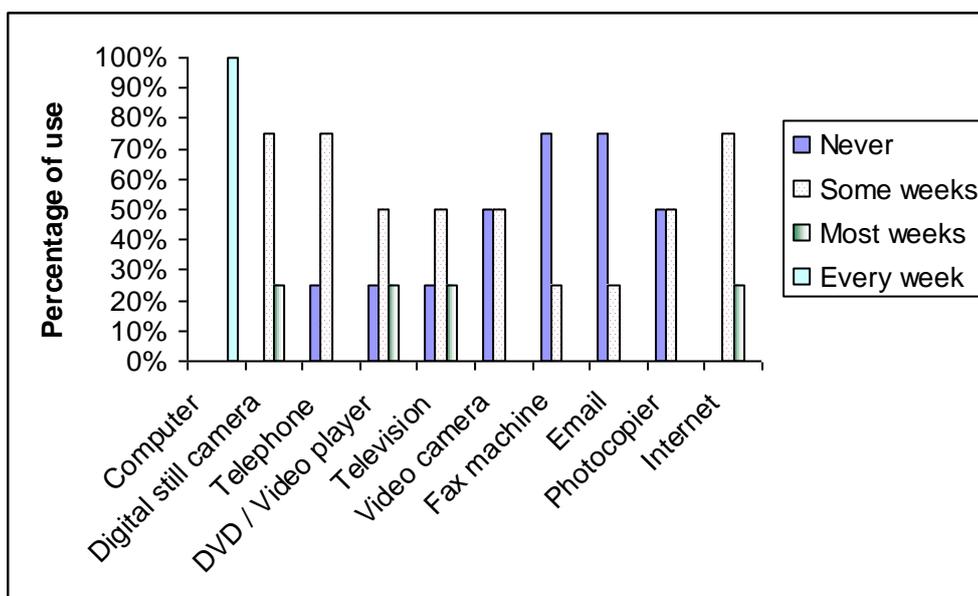


Figure 6.1. The use or planned use of ICT by children in 2007

Figure 6.1 summarises the “use” or “planned use” of ICT in the education and care environment. Of interest is the number and type of ICT resources that are never used with children. Of the ten ICT resources identified in the survey children had access to only one on a weekly basis: the computer.

Evidence suggests that teachers do not share a common perception of the types and number of ICT being used with children. For example, in nine of the ten categories teachers had conflicting views over the frequency with which children engaged in the use of ICT.

The most frequently used pieces of ICT in the education and care setting by children were the KidDesk IBM computer, followed by the digital camera, video/DVD, television and the internet. Teachers were also asked to explain how they used (or planned to use) the most frequently used piece(s) of ICT. The teachers commented

that children had access to the KidDesk computer daily. However, other forms of ICT such as the digital camera or the photocopier were generally only made available when its use linked to their programme planning focus. Georgia commented that:

*Sometimes programme planning is done focusing on ICT so children get a chance to take photos, use email, photocopy etc, but this does not happen very often.*

Teachers were asked to indicate how informed or knowledgeable they felt about the potential dangers of using ICT with young children and the wider safety issues surrounding its use. Table 6.6 highlights that three of the teachers felt informed about these potential dangers. Eva, who was not a qualified early childhood teacher, indicated that she felt “not well informed” of this issue, although she had previously indicated that she was ‘proficient’ at using ICT with children to extend their learning.

Table 6.6

*Education and care teachers’ knowledge of potential dangers of ICT use and young children*

<b>Informed &amp; knowledgeable</b>	<b>Not well informed</b>	<b>Not sure</b>	<b>Informed</b>	<b>Very informed</b>
Potential dangers of using ICT with young children	1	0	3	0
Safety issues surrounding the use of ICT	1	0	2	1

Teachers were also asked to indicate if they talked with children about the safety issues surrounding the use of ICT. Results show that there are quite different approaches within the team concerning this issue with one teacher not discussing safety issues at all with children.

#### *Children’s learning and ICT*

Teachers were asked to apply a ranking to the reasons why ICT is used within the Education and Care Centre. Table 6.7 summarises their responses regarding the most important reasons for using ICT with children and the educational significance. The two reasons most highly reported for using ICT with children were “to develop their basic skills and computer literacy” (n=4) and “to develop children’s thinking and

problem solving skills” (n=3). Three of the teachers applied the lowest ranking to children using ICT “to develop skills for further jobs”. Half of the teachers indicated that they felt “encouraging children to become critical consumers” was not important or was “least important”. What is interesting to note is that encouraging children to reflect on their own learning through the use of ICT was viewed as “not very important” or “not important” by all of the teachers.

Table 6.7

*Teachers’ reasons for ICT use in the education and care centre*

Reason for ICT use in ECE	Ranked		
	1st	2nd	3rd
To develop children's basic skills & computer literacy	4	2	0
To develop children's thinking & problem solving skills	0	3	2
To develop skills useful for further jobs	1	0	0
To develop social skills for collaboration & working with others	1	1	2
To encourage children to reflect on their own learning	0	0	2
To encourage children to become critical technology consumers	0	0	0
Total	6	6	6

Teachers were also asked to apply a ranking to the level of the education sector in which they thought ICT was most important. Three of the teachers indicated that they felt the use of ICT was least important in the early childhood sector. Two of the respondents indicated that the most important use of ICT occurred in the tertiary sector. In the follow-up interview Frankie commented:

*I put one [highest ranking] next to primary school education because I think that’s the foundation of learning... by the time they move on to secondary, they’ve got more knowledge ... to further develop their ICT skills.*

This comment assists in illustrating some of the perceptions that surround ECE and the use of ICT by young children. Such comments would suggest that there is a perception that not a great deal of learning occurs prior to school.

### ***Professional development***

The teachers were asked to indicate if they had attended any professional development courses on ICT in education over the past two years. Frankie had engaged in professional development focusing on the use of ICT with children. This was undertaken as a requirement of receiving the KidsDesk computer from IBM. Access to professional development that meet the Centre's needs with regards to ICT was raised as an area of concern. For example Daisy reported that:

*There has not been one single course this year on ICT because at least one teacher goes to every course. I think if the course was available there would be definite interest in the Centre from particular teachers.*

Daisy continued to say that any courses she had seen advertised by different professional development providers was not focused specifically on early childhood education.

### ***Barriers to the integration of ICT***

Teachers were asked to apply a ranking order to the three main barriers inhibiting the successful use of ICT for learning and teaching. Table 6.8 provides an overview of the barriers identified. Daisy and Frankie identified the most significant barrier as the cost of the equipment. The lack of teacher time and teachers' knowledge of the equipment were also raised as issues by Georgia, Frankie and Eva.

A further concern expressed by the teachers related to the environmental set-up, accessibility and positioning of the ICT equipment. Teachers talked about having to take children out to the office to use the ICT equipment and this created problems with having enough time in the day to do this and ensuring that an appropriate number of teachers remained on the floor. Teachers also stressed that the teachers' office was small and was not appropriately set up for children. During the interview Daisy indicated that it would be helpful if there was a designated area in the Centre for ICT use by children. She suggested that it would incorporate the types of ICT equipment available in an office.

Table 6.8

*Barriers affecting the use of ICT in the education and care centre*

<b>Barriers</b>	<b>Ranked</b>		
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>
Cost of the equipment	2	0	0
Lack of teacher time	1	2	0
Obsolete technology	0	0	0
Lack of teacher interest	0	0	0
Availability of the equipment	1	1	1
Teacher knowledge of the equipment	0	0	2
Teacher understanding about the value of use	0	1	1
Cost and availability of technical support	0	0	0
Teacher knowledge & philosophy about good teaching	0	0	0
<b>Total</b>	<b>4</b>	<b>4</b>	<b>4</b>

***ICT framework for ECE***

Teachers were asked to indicate how familiar they were with the Ministry of Education’s ICT policy developments in ECE. Three of the teachers indicated that they did not feel well informed about the ICT framework. It is noteworthy that Frankie, the only teacher to have attended any professional development focusing on ICT in the previous two years, indicated that she was “not well informed” of this policy document. Daisy identified that she did feel informed, however, during the follow up interview, she commented that it would be helpful for the Ministry of Education to make some information available which assists in showing different approaches to using ICT with children. She stated:

*There is no course handout or something like that saying this is what I think and ... these people think... There is no guidance it’s like ICT is here and how you promote it is up to you.*

After further discussion and reflection Daisy did acknowledge that she was not familiar with *Foundations for Discovery* (2005), the ICT framework for ECE.

### *Summary*

Findings from Phase Two demonstrate that the perceived frequency of ICT use has increased over the past two years and all teachers identified their skills in the use of the equipment as emerging or proficient. Teachers' confidence and use of ICT in the learning and teaching programme ranged from good to very good. The questionnaires show that the Education and Care Centre had access to a wide range of technology although children had access to only one item of ICT on a weekly basis. Teachers placed priority on children learning computer literacy skills and higher order thinking skills in ECE when engaged in the use of ICT. Children reflecting on their own learning was given a low priority.

This section has identified that only one teacher had participated in some form of professional development relating to ICT in the past two years. Access to appropriate professional development was raised as a concern by teachers. Teachers also identified a number of issues and concerns affecting the integrated use of ICT, including: the extra time it takes to engage with the technology, cost of the equipment, and the physical set-up in the centre (e.g., teachers having to take children to the outside office to make use of the ICT available). The next section reports on the interviews conducted with the education and care teachers.

### ***Teachers' perceptions and practices***

In Phase Three individual semi-structured interviews were conducted with the teachers of the centre. Information data are presented under the related research questions.

- What are teachers' perceptions of using ICT with young children in the ECE settings?

### *Teachers' changing view of ICT*

The role of the teacher was an important theme during the interviews. All of the teachers indicated that their role consisted of instructing / demonstrating to children the process of using the computer.

For example, Eva stated:

*I find with the ICT ... especially the computer it's very specific. You have to use it in a particular way, you've got a mouse ... and you make clicks, rather than just offering them [the children], say, some blocks and they do whatever they want with them. You know, to make the computer work, they need very specific skills.*

In the interviews Georgia and Frankie suggested it was the teacher's role to ensure that children use the equipment appropriately. Georgia described this further by suggesting:

*Teaching them (the children), the kind of tikanga behind it, that it's important that you don't eat around it, because it can break. That ICT is a valuable tool and you need to be careful because if it breaks then it's very hard to fix.*

The importance of children learning from peers and through observation was acknowledged with regards to using the computer. Daisy maintained:

*It's just like if there is a child in that learning area and they need support then we would give it and the children are quite good at yelling at us, calling out and asking us "it's not working come and help me".*

Daisy also suggested that ICT is very much a part of the society in which we live although, when children are exposed to it, ICT is often viewed in quite a negative way. She qualifies the moral panic around the role of ICT and suggests that perhaps ECE might have some part to play in changing this attitude to technology. Daisy states:

*I think this is the way the world has gone and we are going to have ICT and computers whether we like it or not. It is a part of our lives now and maybe we need to embrace it a little bit more now than what we do because it is kinda seen a little bit negatively.*

In exploring this negative perspective the teachers were asked to consider how useful *Te Whāriki* (Ministry of Education, 1996) was in guiding the use of ICT in the centre. Teachers commented on *Te Whāriki* being holistic and open and that it was possible

to link it to the strands and goals. Exploration was one strand that was identified where ICT could possibly fit. Daisy commented that:

*...there is really no direct link and I can make links to it because I know the curriculum so well. There is not an actual goal or area developed for ICT use.*

Concerns about the computer being a passive learning area, where children spent an exorbitant amount of time or worked in a solitary way, was a common theme during the interviews. As an outcome of these concerns the Education and Care Centre had introduced a range of strategies to guide the use of ICT by children. For example, children had to ask to have the computer turned on and generally teachers would oblige unless it was too close to a transition time. Daisy commented that this ensures that the teachers retain control over the technology:

*They [the children] don't have access to ICT without us [the teachers] granting permission so then you have the control.*

A timer is also set for ten minutes when children use the computer before having to find another activity to move to. Daisy stressed the importance of being cautious about how much time children were allowed to use ICT.

*... I suppose we are also a little bit uneasy if a child is really into the computer of leaving them with that amount of space and time to explore. You know they are only allowed ten minutes and then they have to move away, there are rules surrounding it whereas there are no rules surrounding other areas of the curriculum.*

Teachers talked about the importance of offering ICT as another curriculum area and not something that was used by “special children”. However, further probing revealed that ICT was viewed as a “special thing” in the learning environment and therefore it was important to have rules around it.

There was also evidence of moral panic over children who were viewed as being “addicted” to the use of computers. In at least one case, the teacher believed this “addiction to the computer” had become evident in the ECE programme. The computer had been used as a tool to ease transitions for a particular child. Through the teachers’ offering computer use to the child in this way a dependency was created.

Georgia reports:

*He is one child who, in the morning, clings to his mum ... and we used to use the computer [as a settling tool] ... Then we found that that the computer was something that was a regular thing for him so we had to try and pull him away from it because he didn't need it any more.*

Teachers commented that they found this dependency so extreme that they decided not to offer the use of the computer in the Centre for a while. The interview sought data on what it was that the child was actually interested in doing on the computer.

Georgia's response was:

*There was one [programme] where you got to make a movie and there are certain things that he likes, like trains and rocket ships and they have little programmes. ... I'm not actually 100 percent sure of what exactly it was that interested him. But I do think it was based around watching other children use it and then being able to learn it himself.*

It is interesting to note the terminology that was used by teachers to describe children who spend sustained periods of time working at the computer. They often referred to them as “addicted”, “naggy”, “distracting”, “obsessive” and not engaging in the early childhood programme offered. However, teachers in the Centre were aware that the child very much enjoyed working at the computer and Frankie acknowledged this by conceding “it's his favourite thing”.

Teachers indicated that a certain level of knowledge or computer literacy was required by them in order to facilitate children's learning in this area of the curriculum. As stated previously, the teaching team felt more confident in teaching their colleagues ICT skills and knowledge than they did in teaching children in their Centre.

During the interviews most teachers indicated that staff needed a particular level of knowledge and skill in using ICT in order to competently use it with children. The importance of teachers having a positive attitude to using ICT with children was also raised as a potential issue. Georgia pointed out that she had seen some teachers avoid the computer area, as they were not knowledgeable or confident in its use and preferred to leave this area to others to supervise.

Networking opportunities appeared to be highly valued in the education and care environment. These opportunities tended to arise through participating in professional development opportunities (not necessarily related to ICT) with others and through personal contacts in the ECE field. Daisy articulated the importance of such opportunities:

*The professional dialogue that we have with other early childhood teachers is important because although we work in a team it can be very isolated if we don't find out what other people are doing. When you do network that is when some of the greatest changes can happen. We can take some of their ideas and mix them with our own to create something that works for us.*

A recurring theme throughout the interviews was the control that teachers had over all the ICT that was offered, including the KidsDesk computer, which was specifically designed for use by children. Their reasoning behind this concerned that ICT was expensive and that teachers did not feel comfortable with children using it for extended periods of time. When discussing why teachers acted in this way, Daisy began to explore her own bias. She indicated that she was concerned about children spending too much time at a computer and missing out on other important learning experiences and acknowledged that perhaps she did view ICT quite negatively.

### ***Linking with children's home lives***

Using ICT as a tool to communicate with parents (e.g., emailing the newsletter) and inform them about what their child had been engaging with in the Centre was a frequent theme. Teachers commented that the use of photographs also helped to alleviate any of concerns parents had about their child being upset at separation, as they found them reassuring.

Eva elaborated further:

*I find that when you take photos of the child having a happy time at the centre, that really helps the parents because they know that their child isn't crying the whole time.*

Children also regularly brought into the centre popular children's DVDs / videos to watch and CDs of contemporary music to share with the other children. Daisy also

suggested that if ICT is part of the child's individual learning programme then there is a more concentrated effort of linking the technology into the child's home life. A recent example had included a child emailing her parent a letter and photograph, which shared information about the child's day in the centre, and the parent replied. Children also made spontaneous links to the type of technology that they had available in their homes as they talked about their computer / software and when listening to CDs or watching DVDs.

Teachers were asked how they communicated to parents that children attending the Centre had access to ICT resources. They reported this was not a subject that was discussed with parents, as teachers believed ICT was just another experience that was offered in the educational programme. Daisy stated in her interview that teachers don't consult with parents over the use of paints in the centre so why would ICT be any different. She stresses:

*It is similar to saying to a parent do you agree with the use of paints? If their child gets paints all over their clothes they are probably not going to agree with it and if they say no you have opened a can of worms. You are kind of justifying is it ok and then they have the opportunity to say well it's not ok. You know the reason why you provide paints it just like you know the reason why you provide ICT because it is part of the curriculum.*

This perception of how teachers believed parents felt about the use of ICT was repeated on a number of occasions and a strong view was evident that parents trust the teachers' judgement. Daisy went on to say:

*Parents ultimately know that we are providing an educational area for their children and trust the fact that everything that we put inside of it is educational.*

### ***The ICT Education and Care Centre experience***

This section explores the nature of the ICT learning experiences to which children had access both in their home and ECE setting. It addresses the following research question:

- What is the nature of the ICT learning experiences young children have in the home and ECE settings?

As previously shown, ICT that was made available to children who attended the Centre was very much teacher controlled and regulated. Children were only able to access the Kidsdesk computer that had a range of pre-loaded software during restricted times. When children were given access to the computer they were allowed to be there for ten minutes and this was monitored using a preset timer on the computer. However, teachers reported that children generally stayed there until they were asked to move away. Another rule surrounding the use of the computer is that only two people should be seated there and teachers prefer that other children do not stand around or take extra seating to the computer. While teachers acknowledged that just like any other curriculum area children really enjoyed it when teachers engaged with them, the computer was viewed as an area where children worked on their own. Georgia suggests:

*The children love it when a teacher sits down at the computer with them but we only tend to extend this area if it is part of the programme focus. Teachers often see the use of the computer as independent work by children and that they don't require any assistance by teachers.*

Teachers talked about the importance of children learning the appropriate way to use this technology. This was related to the expense of the technology but also to the specific skills needed in order to follow an exact process to ensure the successful use of the computer. The teachers also believed that children should learn about the monetary value and fragility of such technology.

Other forms of ICT that were used by children under teacher supervision were the stereo and the digital camera. Daisy commented that recently children had accidentally broken the camera and, as an outcome, the Centre was only just starting to allow children to use it again.

### *Issues and challenges*

Following up on the questionnaire data, teachers were asked to highlight barriers that inhibit the successful use of ICT into the educational programme. This follow up interview explored the research question:

- What issues, real or potential, do parents and teachers perceive with the introduction of ICT into ECE settings?

The most significant barrier identified by two of the teachers was the cost of the equipment. Teachers talked at some length about using the Ministry of Education's basic equipment list for licensed early childhood centres (2004b) as a guide to obtain funding to purchase equipment for the Centre. Daisy commented that ICT does not appear on this equipment list and therefore was not an item for which funding could be requested:

*The equipment list is a guide and it is to make sure that you are at the correct standard for the number of children, so we use it to see if we have more or less than recommended. That is how I developed my equipment budget for the year and it came to three and a half grand and we are only allowed two hundred and fifty dollars a month. So that's the basic equipment list and we have to get that stuff first before we do anything else.*

As indicated earlier the lack of teacher time was ranked as the "most important" or next most important concern that teachers had when using ICT in a centre. This concern was particularly emphasised in the mixed age centre as much of the day was guided by routines and it was felt that fitting the use of ICT around this posed an extra challenge. Georgia insisted that:

*... it's also harder being in a mixed age group because a lot of time does need to be spent teaching children how to use ICT and I do think that it's more teacher directed rather than child directed.*

Daisy suggested that the financial aspect coupled with the teachers' perceived pedagogical knowledge was also a concern.

*Our biggest issue is financial and not knowing, not having enough grounding ourselves in that particular area of the curriculum so that we can provide children with more stimulating environment towards ICT. If we knew more we would probably do more.*

What is noteworthy here is that all of the teachers interviewed commented that ICT was not a “real passion” of theirs and therefore, the question could be asked about who would attend this professional development? Frankie’s comment below is indicative of all of the teachers interviewed.

*I kind of like to go with the children’s strengths and interests and what they bring into the centre and I just don’t think ICT is really one of them.*

Broken equipment was a recurrent issue. In further expanding on this theme, teachers described how they had been through five cameras since they started using them. All but one of these cameras had been broken through teacher use but they believed it emphasised how fragile these resources were. In an Education and Care Centre the owner is not always present on a daily basis and, therefore, can be unaware of how regularly some ICT resources are used. As no technical support is available in this centre if something is broken it can be a timely process before it is repaired or replaced by the owner. As stated previously there is also an issue concerning the environmental set up, accessibility and positioning of equipment.

The lack of space, power points, and internet access (only available in the office) were identified as areas of concern. This was particularly evident in the Education and Care Centre as it was a remodelled house providing quite limited space.

### *Summary*

The findings show teachers viewed their role as an instructor where they demonstrated particular skills required when using technology. Teachers found it challenging to draw concrete links between the use of ICT and *Te Whāriki* (Ministry of Education, 1996). However, they suggested that because of the holistic approach advocated in the curriculum they could quite easily justify its use. A number of rules were evident around children’s computer use and these appeared to be influenced and mediated by teachers’ pedagogical beliefs, experiences and understanding of ICT in ECE. Teachers were critically reflective of their underlying beliefs on the role of ICT

and engaged in discussion about how they do influence the ECE programme. A number of barriers were identified which negatively impact on the use of ICT in the ECE setting, these include, but are not limited to, issues with time, cost of the equipment and technical support, environmental set up and lack of teacher interest in the subject itself.

### *Parent surveys*

In the second phase of the research all parents and caregivers of children currently attending the Education and Care Centre were invited to complete a questionnaire that sought data on their perceptions and practices of using ICT with young children. Forty five questionnaires were made available to the Centre and six were returned, (13% response rate).

### *A review of participant information*

Parents were asked to indicate their relationship to the child who attended the Education and Care Centre. Five mothers completed these questionnaires and one father. Information regarding ethnicity was sought from participants with five respondents identifying themselves as Pakeha/European. A further participant identified himself as Asian. An indication of age was also sought and all of the parents/caregivers indicated they fitted into the 30 and 39 age category. All parents had completed secondary school with a qualification and two of the parents indicated that they held “other” qualifications. All participants had two children under the age of sixteen living in the household.

### *Nature of the ICT learning experience*

The questionnaires sought information about the level of access to ICT that was available in the home environment. This information sought to explore the following research questions:

- What is the nature of the ICT learning experiences young children have in the home and ECE settings?

As illustrated in Figure 6.2 the families indicated that they had access to technology in all seven categories. However, families were least likely to have access to a fax machine, scanner or photocopier. One family indicated that they had access to “other” forms of ICT, which they identified as an MP3 player. Information about access to the internet was also sought from parents. The results show that broadband is the most common type of access (100%).

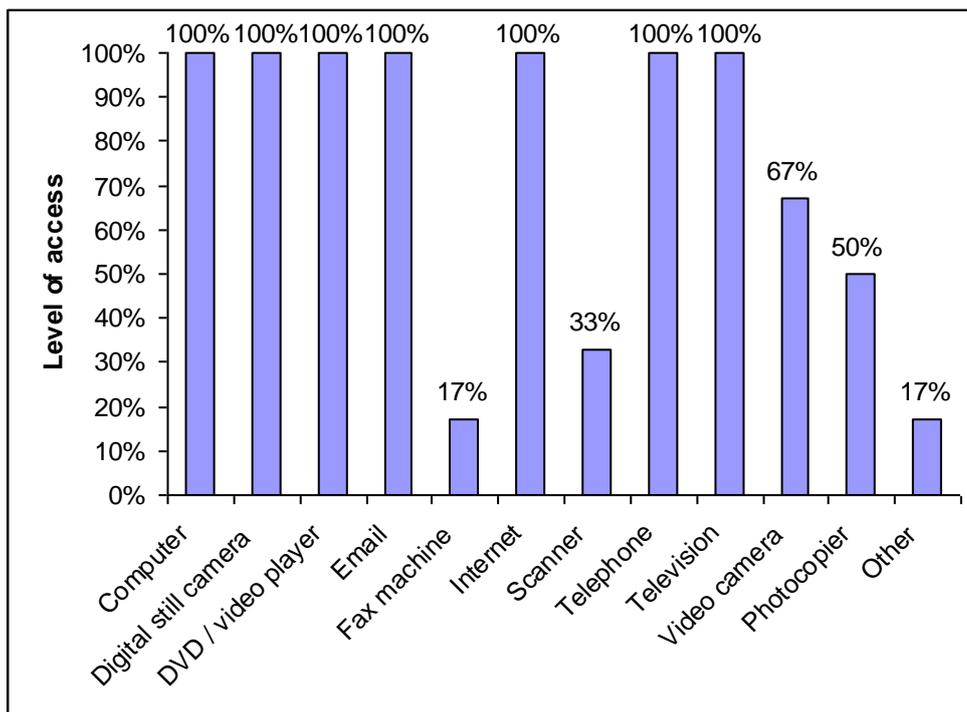


Figure 6.2. The level of ICT access available in the home environment

Parents were asked to indicate which forms of ICT were available for their child to use and where it was made available. Five families reported that children had access to a television and video and / or DVD in the living room and one child also had access in their parents’ bedroom as shown in Table 6.9. At least half of the children had access to a range of mobile devices, for example, telephones, cellular phones and digital cameras. Five of the families indicated that they provided access to the internet. In a number of cases similar forms of ICT equipment were available for children to use in different areas of the home, for example, computers were available in the living room, study and / or office.

Table 6.9

*ICT available for children's use and place of access*

	<b>Living room</b>	<b>Bedroom</b>	<b>Other</b>	<b>No access</b>
Computer	3	0	3	1
Scanner	0	0	1	1
Digital camera	3	0	0	1
Telephone	4	0	0	1
Television	5	0	0	1
DVD / video player	5	1	0	1
Video camera	2	0	0	1
Internet	3	0	3	1
Playstation / Xbox	1	0	0	1
Cellphone & other mobile devices	4	0	0	1

Figure 6.3 provides an overview of how often the child was able to access the computer in the home setting. While three children were able to access the computer on a weekly basis one child had no access available to them in the home. Parents who did allow their children access were asked: how much time their child had spent using the computer in the past week. Three parents indicated that their child had used the computer for less than one hour. In contrast, two parents indicated that their child engaged in between one and five hours of computer use in the home each week. Information about how much time children spent on the internet was also sought.

Five parents indicated that their child had spent between one and five hours on the internet in the previous week and one parent stated that their child did not access the internet at all.

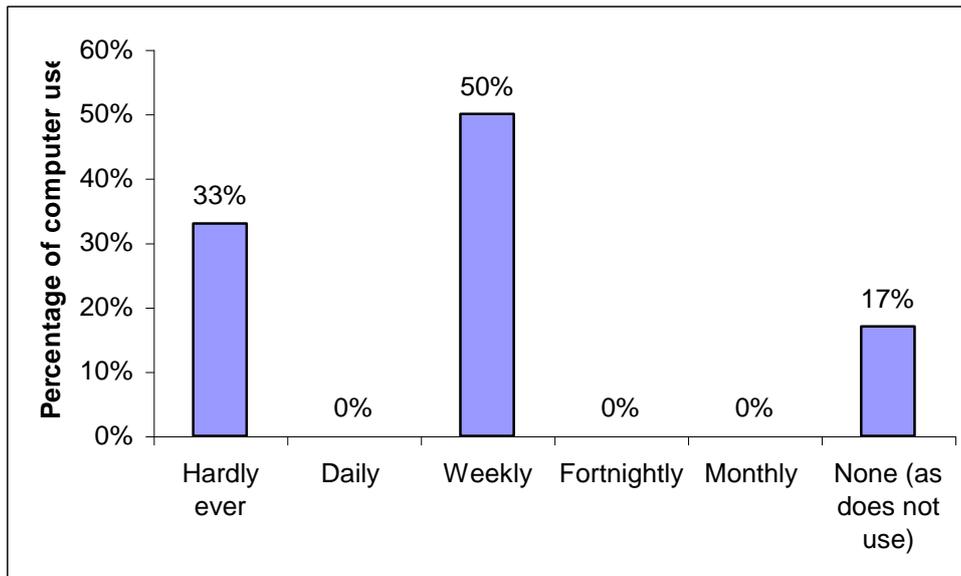


Figure 6.3. Frequency of child's computer use in the home setting

Figure 6.4 shows what activities the children engaged in when they used the computers in the home setting. Using CD-ROMs to play games was the most frequent activity children engaged in when working with the computer (n=3). Parents cited "other" as being one of the most frequently engaged in activities; this included using websites to look up areas of interest and playing internet games on children's television websites.

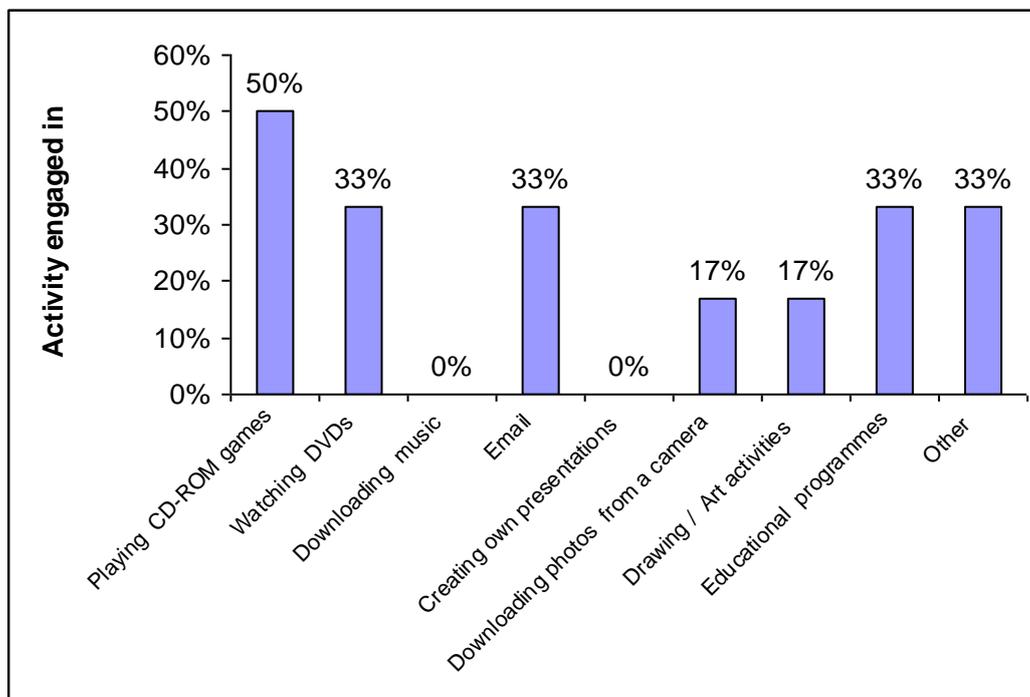


Figure 6.4. Computer use and activities in which child engaged

Parents were asked to provide some examples of their child's favourite activity on the computer. Responses included:

*Looking up fact sheets on topics of interest on the internet. Likes to know about animals and bugs, we look up fact sheets to find out what they eat / where they live.*

*Drawing in the paint application.*

The level of parental concern was investigated with regard to what children were actually doing when they were using the computer. Half of the respondents indicated that they were "not concerned" at all. Two of the parents indicated that they were "somewhat concerned" and one parent did not respond. Parents were asked to elaborate on how they supervised and / or regulated the use of the computer by their children. Three parents indicated that they sat with their children to monitor use at the computer. One family commented that they checked on their child's use regularly.

#### ***Parental perception of computer use***

The questionnaire also sought information from parents about their perceptions of the use of ICT by young children. In this section data are reported in relation to the following question:

- What are parents' perceptions of young children using ICT in the home and ECE settings?

#### ***What is the perceived value of ICT use in ECE?***

Parents were also asked to apply a ranking to which level of the education sector in which they thought ICT was most important. All parents (n=6) indicated that they thought the most important use was in the tertiary sector, as had half of the teachers. A large number of parents (n=20) who participated in the kindergarten survey (Case Study One) also shared this perspective. Three teachers from the Education and Care Centre supported this view while two of the kindergarten teachers had refused to answer this question.

Parents from the Education and Care Centre made follow-up comments that while ICT was relevant it was not essential in ECE. Comments included:

*If a child does not have access to ICT at ECE they can catch up at primary school level.*

*ICT in tertiary education is essential. It is useful in secondary education with investigative learning, art etc. It is good to expose children to some technology in the earlier years – but I do not believe that it is essential in ECE, there is plenty of other things to do, learn and master.*

Table 6.10

*Parental view of computers in the home environment*

Parental view	Agree	Partly agree	Not sure	Disagree
The ability to use new technology is essential to young children's learning	3	2	0	1
Children learn so much through having a computer in the home	2	3	0	1
Children do not require access to these technologies	1	2	2	1

Table 6.10 demonstrates that three parents agreed with the statement that it is essential that their children learn with and through these new technologies (50%). Similarly five parents (83%) indicated that they agreed or partially agreed that children learnt through having access to a computer in their home environment. Of interest is the wide range of views expressed when parents were asked if children required access to these new technologies.

Table 6.11 shows that two parents thought that every early childhood centre should have access to ICT resources and computers were seen as one of these resources. Four of the parents “partly agreed” that the money used to fund computers in the early childhood environment could be better spent on other equipment. Noteworthy is that although some parents agreed about funding ICT resources, they still remained “unsure” or only “partly agreed” about the use of ICT by young children in ECE.

Table 6.11

Parental view	Partly Not			
	Agree	agree	sure	Disagree
Every EC centre should have access to these resources	2	4	0	0
Computers are an essential part of the ECE experience	2	3	0	1
The money spent on computers could be better spent on other equipment	0	4	1	1
Children do not need access to computer technology under five years of age	1	3	1	1

*Parental view of the use of ICT by children in ECE*

### ***The safe use of ICT with young children***

Parents were asked how knowledgeable or informed they felt about the potential dangers relating to children’s physical health, emotional safety and social competence when using ICT with young children. It is noteworthy that only one parent indicated that they felt “informed”. The remaining five parents indicated that they did “not feel well informed” or were “not sure”. Several parents expressed concerns as illustrated by the following statements:

*As they grow older they [the children] will know more than I do. They will have access to stuff I don’t understand.*

*Computers and Playstations detract from all other forms of play and decrease socialisation / communication within the house. While children can learn from these technologies they can also detract from other types of learning and daily life if they are not controlled.*

### ***Children’s use of ICT and parental concerns***

A prompt of an image from a recent New Zealand advertisement was used to explore parental concerns. They were asked how concerned they were about their child using this technology in the future. Table 6.12 demonstrates that all parents were a “little concerned” or “somewhat concerned” about their children’s future use of ICT.

Table 6.12

*Concern about future use of ICT*

<b>Level of concern</b>	<b>Number</b>
Not concerned at all	0
Not sure	0
A little concerned	5
Somewhat concerned	1
Very concerned	0

Many parents provided informative comments about their view of ICT and the concerns they have. These included:

*The way the child was shown doing things (on the computer) was a bit unsettling as children are supposed to be learning so much from the outside environment rather than being indoor geeks.*

*My concern lies with what young children can access on the web. I am not a fan of kids using or owning mobile phones. I understand though that new technologies can be fantastic educational resources so I want my child to be computer savvy. I just want him to only access appropriate material.*

***Why use ICT in ECE?***

Parents were asked to apply a ranking to the reasons why ICT is used within the education and care setting. Table 6.13 summarises parents' responses. The two reasons most highly reported for using ICT with children were to develop children's basic skills and computer literacy (n=6) and to develop children's thinking and problem solving skills (n=3). Two participants identified developing children's social skills for collaboration and working with others. A noticeable cluster has also appeared at the midpoint. This was where half of the parents indicated that they believed that ICT is "somewhat" or "not very important" in developing social skills for collaboration and working together. All parents indicted a similar pattern when

considering whether using ICT to encourage children to reflect on their own learning was important. The lowest rankings were applied to using ICT to encourage critical technology consumers (n=6) and for children to develop skills for further jobs (n=5).

Table 6.13

*Parents' reasons for ICT use in the Education and Care Centre*

Reason for use	Ranked		
	1st	2nd	3rd
To develop children's basic skills & computer literacy	4	2	0
To develop children's thinking & problem solving skills	0	3	2
To develop skills useful for further jobs	1	0	0
To develop social skills for collaboration & working with others	1	1	2
To encourage children to reflect on their own learning	0	0	2
To encourage children to become critical technology consumers	0	0	0
Total	6	6	6

This section has established that children have access to a range of technologies in the home environment with half of the children accessing the computer for less than one hour. A further two families indicated that their child had access for between one to five hours per week. Parents reported that they offered a high level of supervision when their children use the computer. Concern over their child's computer use was equally divided. However, most parents (n=5) reported they do not feel well informed about the possible dangers that their children may be exposed to when using the computer and ICT more generally. Data provided evidence that many parents remain unsure about the potential learning opportunities afforded through the use of ICT in the home setting or in the ECE setting. This view was reflected in the high proportion of parents who were unsure or who had no definite opinion about whether children should have access to ICT in ECE and in the home setting. Parents identified that if ICT is used in ECE then it should assist in developing children's basic computer

literacy, problem solving and thinking skills. Parents seemed unsure whether ICT was useful in assisting children to further develop their social skills for collaboration and working together and in reflecting on their own learning. Across the two case studies a large number of parents indicated that ICT is of most importance in the tertiary sector. Three teachers from the Education and Care Centre further supported this view.

### *Children's perception of ICT*

In Phase Three, individual interviews were conducted with two children; as outlined in Chapter Three, the criteria for inclusion included gender and level of ICT use. In negotiation with the supervisor of this centre it was decided that of the returned parent questionnaires, which indicated willingness for their child to participate further in the study, only two children met the criteria set. The question guiding this phase of the study was:

- What are children's perceptions of using ICT in the home and ECE settings?

### *Interviews with children*

The two children interviewed in the Education and Care Centre were aged three and four years. However, the four-year-old boy very quickly became distracted and chose not to engage in further discussion. The researcher followed the child's wishes and through doing so adhered to the ethical guidelines established in the ethics application.

In the Education and Care Centre children had supervised access to several pieces of ICT equipment. These included working at the KidDesk computer with preloaded software and using the digital camera. Photographs of ICT equipment were used to recall and to provide a trigger for discussion around the available technology and the children's use in the centre. On this occasion, however, Emily merely stated what her actions were, for example, "I am on the computer" and she could not be encouraged to extend on this.

The researcher looked for an opportunity to engage Emily in discussion as it was evident through observation that she had a very clear understanding about the rules surrounding the use of the ICT in the centre. When she initially approached the computer she asked the child using it “When is the time up?” (Referring to the ten-minute timer set for each child’s use of the computer). She sat down beside this child and waited until the hourglass appeared and when it did she said “my turn now”.

Emily knew to ask a teacher to help her reboot the computer after it crashed and when it was restarted she noticed the hourglass icon and commented on it. She said, “hey, it’s not time up”.



*Figure 6.5. KidsDesk*

In summary, this section has shown that the selected child had a very clear understanding of the rules surrounding the use of ICT in the Centre. These rules appeared to overshadow the use of this technology and became a strong focus. The child was able to read the icons on the computer (e.g., the hourglass) and seek assistance from an adult.

### ***Interpretive summary***

#### ***ICT a passionless past time***

This chapter has provided detailed information from a case study of teachers’, parents’ and children’s perceptions and practices of the use of ICT in a single Education and Care Centre.

The use of information and communication technologies was clearly part of the teachers’ lives both in the Centre and their homes. While the use of ICT had increased in the Centre over the past two years, teachers’ skills of working with children in this area were still ‘beginning to develop’. Only one teacher had engaged in any professional development focusing on ICT and this was a condition of being donated a computer.

ICT was not a “passion”. This explained why teachers had not sought out professional development. Although teachers acknowledged how pleased they were to have a computer for children to access, their lack of passion was evident in the way they choose not to work in this area.

The impression was teachers were there to supervise the correct use of the equipment rather than extend children’s learning. In fairness, the teachers acknowledged the importance of modelling a ‘positive attitude’ to using a computer. However, the computer was viewed as an area where children could work independently and teachers only approached when there was a need. There is a clear conflict here between the teachers’ approach to ICT and the current approach to assessment advocated in ECE of ‘notice, recognise and respond’ (Ministry of Education, 2004a). If teachers choose not to work alongside children engaged with ICT then how are they to know about children’s interests, knowledge and skill regarding ICT? It is through this individual knowledge of the learner that the teacher can scaffold the child’s learning and interest across the curriculum enabling ICT to be further integrated into the learning programme.

Teachers were generally unfamiliar with *Foundations for Discovery* (Ministry of Education, 2005); thus this document was of little value. *Te Whāriki* (1996) was also of little guidance to teachers with regards to ICT. It was thought that ICT could be linked to the holistic curriculum quite easily. Moreover, because of the holistic nature of the curriculum, ICT could also be omitted. There was no clear understanding of how ICT fits in relation to policy.

Although a wide range of technology was available in the Education and Care Centre, children actually only had access to one piece on a weekly basis. Moral panic was evident in relation to children’s use of ICT. Concern over the length of time children engaged in using the computer resulted in teachers controlling its use. The result here was twofold. Firstly, teachers instigated a number of rules surrounding the use of the computer and, while children had a clear understanding of these rules, they did tend to overpower the learning experience offered. This may have resulted in children

actually viewing the computer as something ‘special’, although teachers stressed the importance of viewing ICT as just another learning experience.

Parents did not rank ICT of high importance in the ECE Centre. This may have been because the teachers, themselves, choose not to talk to parents about any possible benefits ICT might afford in the programme of learning. Many teachers did not view ICT as an important learning experience in ECE and all chose not to discuss its use by children with parents. As an outcome, parents remained uninformed about any positive or negative implications arising from their child using ICT. This approach of keeping parents in the dark does little to dispel the myths that surround the use of ICT in the educational context.

All but one teacher saw little importance of having ICT in the centre for children’s use. The one teacher who indicated that she did value ICT suggested that it was an area where “teachers don’t have to teach” the children, as generally they learnt from their peers.

Although teachers had decided not to talk with parents about the use of ICT in the centre, the surveys showed that both parents and teachers were in agreement about its use. Agreement focused on using ICT to foster children’s thinking and problem solving skills and basic computer literacy skills. Yet there was no link made to multiliteracies during the teacher interviews and evidence would suggest that teachers avoided any direct ‘teaching’ in this area of the curriculum. Parents also expressed concern over the use of ICT by children as they were being distracted from other forms of valuable plays (e.g., outdoors, creative) and also that computers lead to a decrease in socialisation and communication with others. This issue, then, is fundamentally about the lack of consultation with parents regarding how ICT was offered in the curriculum. Moreover, because teachers did not discuss ICT use with parents they remained unaware that any concerns actually existed.

The Case Study revealed as an issue a number of barriers to the successful integrated use of ICT. These barriers included cost of the equipment, time for teachers to learn and practise ICT skills and to work alongside children using ICT.

Finally, it was apparent that teachers' belief systems greatly impacted on their view of ICT and its use by young children, which affected their ability to engage appropriately. The focus appeared to be on amassing ICT resources rather than considering their pedagogical approach. Moreover, ICT was not a 'passion' for any of the teachers and nobody was championing its cause.

In the previous three chapters we have heard the voices of stakeholders and explored their perceptions and practices concerning the use of ICT in ECE. These findings are discussed in the following chapter.

## CHAPTER SEVEN

### Discussion

The new technology is here. It will not go away. Our task as educators is to make sure that when it enters the classroom it is there for politically, economically, and educationally wise reasons, not because powerful groups may be redefining our major educational goals in their own image. (Apple, 1986, p. 174)

This chapter draws together the key findings in relation to the research questions stated in Chapter Three. It identifies the overriding themes that have emerged from the analysis of the data gathered and discusses the gaps that appear to exist between ICT rhetoric and the reality of current practice. The Chapter begins with a brief synthesis of the findings and comparison of the two case studies to paint an overall portrait of the state of information and communication technologies (ICT) in early childhood education (ECE) within a selected region. The influence of teachers' beliefs and self-efficacy and how this mediates their perceptions and practices is discussed and the fluid conceptions of pedagogy are explored in relation to ICT and ECE. The competing and co-existing drivers for using ICT are explored from multiple stakeholder perspectives and the changing view of literacy with a specific focus on multiliteracies and children's learning is considered. The importance of participating in appropriate professional development opportunities and of establishing a strong infrastructure is also examined. The findings are also discussed in relation to the policy landscape in the final section of this chapter where key policy documents and their influences on practice are evaluated. The model of an enabled and enacted ICT curriculum proposed in Chapter Three is used to assess the level of maturity that the centres have reached in using technology in their programme of learning.

#### *Overall portrait of ICT in ECE*

This section comments on the immature state of ICT in ECE from a synthesis of the findings and brief comparison of the two case studies. Using a number of key indicators it builds on the interpretative summary of each case study to show that ICT

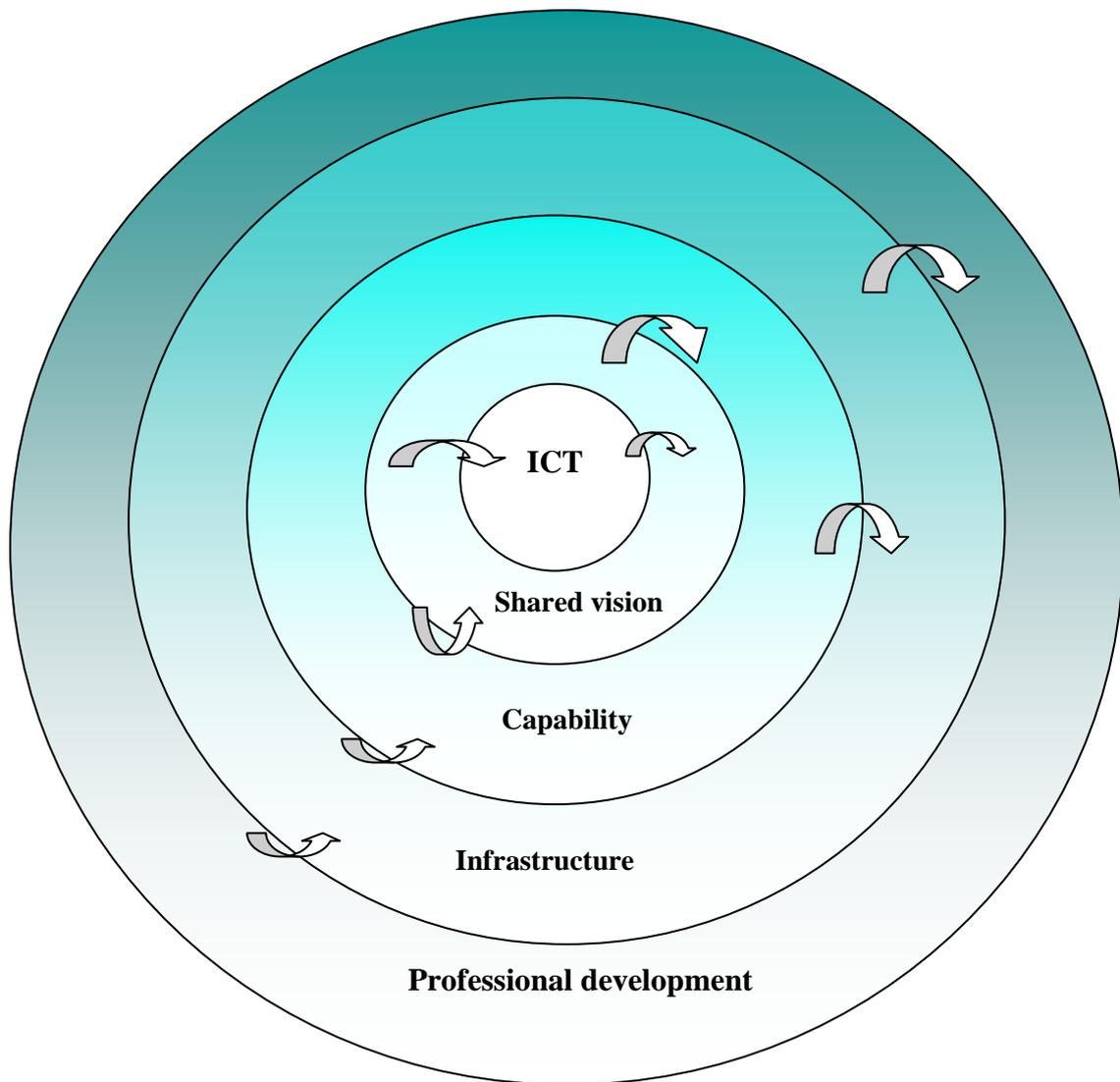
has yet to deeply penetrate the learning and organisational culture of many education and care centres and kindergartens.

Findings from Phase One show that ICT has grown exponentially in ECE. As an outcome of this growth teachers are developing the confidence and competence to use ICT on a daily basis for administrative tasks. In a small number of centres teachers are also providing children with access to using a limited range of ICT to use themselves, although this practice was at best embryonic.

Teachers in Phase One indicated that they learnt about using ICT from a variety of places including their colleagues, home experiences and through professional development opportunities. While the philosophies underpinning the centres that participated in this phase differed, the use of ICT by teachers and children was generally accepted by kindergartens and the education and care sector.

The most up to date technology was owned by the education and care sector, and was predominantly purchased through their operating budget. Teachers from the education and care sector also indicated that they were making steady progress in the use of ICT in their centres. Overall, the highest proportion of computers were either donated or purchased through fundraising ventures.

Phase Two and Three enabled a rich description of the teachers', parents' and children's perceptions and practices concerning the use of ICT by young children in ECE. What quickly became evident were the many variables that surrounded the successful integration of ICT use in ECE centres. Figure 7.1 illustrates this effect by considering a metaphor of technology being thrown into a pond (just like a stone) and the ripple effect this has throughout the many layers that make up an ECE centre. Phase Two and Three identify many of these ripples (or effects) and this research illuminates the significance of these in ensuring ICT is offered in a sustainable and authentic approach to young children.



*Figure 7.1. The ripple effect of ICT in ECE*

ICT had been introduced into both the Kindergarten's and Education and Care Centre's ECE programme. The ICT related experiences engaged in by children did differ considerably across the two case studies, which included access to ICT, purpose of use and teacher engagement. The Kindergarten teachers had a more cohesive approach in the use of ICT than the Education and Care Centre. Kindergarten teachers engaged in reflection about ICT experiences and the learning that they were endeavouring to promote through these opportunities. Although not directly articulated there was evidence of a shared vision for the meaningful use of ICT in this setting.

This shared vision also may have been an outcome of the whole of centre approach to professional development. Arguably, this shared time together provided them with the opportunity to enhance their technical skills and knowledge at the same time engaging in pedagogical discussion and debate about the proposed approach to ICT use.

What also became evident is that, in order for this vision to be enacted successfully in the Kindergarten, a solid infrastructure was required. The functional requirements of this infrastructure should assist with technical support, budgeting of ICT, changes to the physical environment, upgrading equipment and policy. The infrastructure in the Kindergarten was lacking. As teachers indicated, equipment was being purchased through fundraising and, if equipment broke down, they often relied on a parent to repair it. The teachers in this centre also identified the physical environment and lack of space and electric sockets as a barrier to successful use of ICT. Therefore, it would appear that without a strong infrastructure an ICT ripple could only go so far in preventing the pond from becoming stagnant.

In comparison, the teachers from the Education and Care Centre stated that ICT was not a passion of theirs, although they did offer it in their programme. Their lack of passion was evident in the shared approach teachers took to 'not working' with children with ICT unless a child specifically asked them to assist. In this centre only one teacher had participated in any form of ICT professional development and this was actually a requirement of the computer being donated. Therefore, it was not surprising that three quarters of these teachers indicated that their capability in working with children and ICT was only emerging.

The lack of a strong infrastructure was also evident in the Education and Care Centre. The teachers also identified issues with the physical environment, upgrading equipment and technical support. Strong leadership in the use of ICT with young children could also be viewed as an important aspect of infrastructure; however this also appeared to be lacking in this centre. This finding is not surprising to find when not one of the teachers in the centre was particularly interested in its use. When considering the metaphor of the pond in Figure 7.1 it could be said that ICT in this

centre is like a tiny pebble being thrown into a large pond. While a minute ripple is evident when ICT is first introduced in the centre the pond quickly returns to its normal state.

In summary, it appears that the kindergarten teachers had reached a greater level of maturity in their use of ICT and their practices highlight the importance of the integrated nature of ICT in ECE. This section assists in highlighting the multifaceted nature of ICT and the significance of the ripples in the pond working in harmony. One ripple affects the next and if the momentum of ICT integration is not maintained then the pond will flatten out and possibly stagnate. The question remains as to how much disturbance will continue above and below the surface of the metaphorical pond when teachers continually encounter barriers to using ICT in their programme.

### ***Influence of teachers' beliefs and self-efficacy***

The findings confirm the extent to which successful use of ICT in the ECE environment is dependent on the prior experiences of the teachers and their prevailing beliefs. As noted in the literature review, the attitudes and pedagogical orientation of the teacher is embedded throughout the programme of learning, directly or indirectly. Kagan (1992) claims teachers are not always clear about how their individual beliefs are influencing their own practice and as an outcome find this challenging to discuss. This point was supported in the case studies where teachers expressed concern over children's social, emotional and physical well-being. Their concern often led to teachers restricting children's use of ICT considerably. On the other hand, it was evident that teachers supported the use of ICT by young children as they physically made a range of resources available to them. In many respects the teachers were torn between the importance of ICT in children's lives from a societal rationale and a degree of moral panic over the dangers that new technology may have on their holistic development.

On the whole, the findings suggest that teachers' concerns about children having unrestricted access to ICT have won out over fully integrating new technology throughout the learning programme. For example, in the second case study teachers

from the Education and Care Centre talked about the importance of children asking to use the technology, which ensured that “teachers retained control”. This was important for them, as they felt uneasy about children having unrestricted use of what was perceived to be a “passive” learning experience.

In a similar vein, the case study undertaken in the Kindergarten shows that ICT related learning was viewed as being an “artificial group experience”. It was not perceived to be as valuable for children’s learning as “working together on a project”. Such beliefs, whether justified or not, resulted in teachers restricting children’s access to the technology during certain time periods. The length of time children spent engaged in ICT related learning experiences was also heavily monitored, with timers on the computer to limit overexposure to technology. Notably, the pedagogical approach adopted in both cases is at odds with the current focus advocated on “free play” in the New Zealand ECE context (Ministry of Education, 1996a, 1998, 2004).

O’Hara (2008) also found evidence of this reactive supervision underpinned by a form of neo conservatism in his study on the use of ICT conducted in four foundation stage schools in the United Kingdom. The aim of O’Hara’s qualitative study was to highlight aspects of the technological dimensions of childhood particularly focusing on the interactions young children have with ICT in education. It sought to investigate pedagogical claims and counter claims made about the use of ICT by young children. This type of supervision commonly manifested itself by teachers monitoring the use of ICT by whom and for how long. O’Hara (2008) found that this often occurred because of the competing and sometimes conflicting priorities of working in an education setting.

Offering ICT in the curriculum through using such a tightly controlled approach does send messages to both children and families, and is clear evidence of a new wave of moral panic. Chapter Two reviewed the vigorous debates that have occurred over the role of ICT in ECE (Alliance for Childhood, 2004; Brady & Hill, 1984; Elkind, 1987) and the research which indicates that deep-seated concerns still exist in ECE. Conflicting opinions about the potential value of the use of ICT in education were

revealed in the present study, which reflect the debates in the literature between psychologists, cognitive scientists, philosophers and technologists.

Tsantis, Bewick and Thouvenelle (2003) suggest that conflicting views and the uncertainty that surrounds the integration of ICT is creating a barrier for teachers to examine their own beliefs. As the literature review highlights, it is not until these beliefs are challenged or cannot be assimilated into existing ideas that transformation occurs (Kagan, 1992).

The key point is that the findings provide clear evidence of how teachers' beliefs are mediating and influencing their professional practice. When engaging with teachers and centres in this study it was very clear that their focus was on the "use" of ICT in ECE rather than "integrating" it throughout the culture of the programme. Although a definition of ICT was provided and discussed with teachers their focus was squarely on the use of computers by children. This narrow interpretation of ICT is not new to ECE (Plowman & Stephen, 2005), and can limit learning opportunities.

Teachers in the Kindergarten case study suggested computers were a solitary learning experience and teachers in the Education and Care Centre case study raised concerns about children being addicted to, or becoming obsessed with, the use of the technology. These beliefs were so entrenched it was not until questions were asked about how ICT fits with the teaching philosophy that teachers began to reflect and re-evaluate their responses. For example, a teacher in the Education and Care Centre stated:

*... I suppose we are also a little bit uneasy if a child is really into the computer about leaving them with that amount of space and time to explore. They are only allowed ten minutes and then they have to move away you know there are rules surrounding it whereas there are no rules surrounding other areas of the curriculum. So maybe how we view it is a little bit negative.*

This example demonstrates Richardson, Tapia and Kvasny's (2006) claim of the importance of engaging teachers in discussion and critique of ICT in order to

challenge many of their assumptions and beliefs. Gibbons (2006) advocates that teachers involved in using ICT with children "... should be encouraged to back (and voice) their decisions regarding technology, as these decisions reflect the complexity of contexts within which educators practice" (p. 12). It is through this critical reflection and dialogue that teachers develop a greater understanding of their practice.

Importantly, reflection operates on a number of fronts and to reflect on the purpose and use of ICT, teachers also need to know something about the mechanics of the technology. Without this type of basic knowledge it is problematic to expect teachers to critically reflect on the role of ICT in ECE. In this respect, knowledge begets knowledge and without a basic level of technical know-how it is hardly surprising that teachers are unable to clearly articulate why they use ICT in the way they do. The crucial point is that basic technical knowledge feeds and needs to go hand in hand with a deeper understanding of an ICT enabled curriculum (O'Hara, 2004; O'Rourke & Harrison, 2004; Patterson, 2004; Siraj-Blatchford, & Siraj-Blatchford, J. 2003). Cunningham, Perry, Stanovich and Stanovich (2004) call this "knowledge calibration". That teachers need good knowledge about a domain in order to make good choices about resources and pedagogy. The greater the knowledge, the greater the calibration with pedagogy.

Although an increasing focus on pedagogy was the distinguishing feature of the second wave of research and policy relating to ICT in education, the findings indicate that this shift requires closer analysis as changes to pedagogy and technology are woven together.

There is a great deal of rhetoric, possibly almost propaganda, but certainly enthusiasm expressed about the many benefits that exist for those fluent in ICT and its applications. Teachers caught in the middle of this rhetoric do not always appear to have all of the information required to inform their ICT pedagogy. This pedagogy is more of a "work in progress" and while it is admirable that enthusiastic teachers have decided to start on their journey, without all of the essential tools, a gap is clearly evident in their practice. Teachers in both case studies appear to be experiencing an

inner-struggle with aligning their values and beliefs and the use of ICT by young children. Principle Three of an enabled and enacted curriculum proposed in Chapter Two focuses on teachers' beliefs aligning with the articulated philosophy and it is evident from the findings that many teachers are only just beginning on this journey of understanding.

### *Fluid conceptions of pedagogy*

As established in the literature review, an eclectic range of theories has shaped the average early childhood teachers' pedagogy in New Zealand. However, those that remain influential today are primarily constructivist and social-constructivist. Therefore, it was important to note that in the case studies teachers appeared to utilise a didactic way of teaching when demonstrating how ICT works. Although a direct teaching method is not currently in vogue in ECE, the findings suggest teachers adopt this approach on the justification that technology is expensive and teachers perceive this approach to be a way to ensure that children learn about the steps involved to successfully use these resources appropriately. As children become more familiar with ICT, teachers claimed that they took a more constructivist and/or social-constructivist approach to learning, in which children were encouraged to explore and engage in the use of ICT with their peers, within the parameters set by the teachers.

A clear difference in approaches was noted in the two ECE settings. Kindergarten teachers claimed that they took this learning further, by drawing on their knowledge of individual children's skill and expertise in order to provide an appropriate level of extension to this learning. This finding provides tentative evidence to suggest that teachers working with ICT and children in this manner are engaging in slightly more mature pedagogical practice, which is closer to Principle Two of an enabled and enacted ICT curriculum: that is, "ICT is used in a holistic way to promote collaborative, meaningful and authentic learning opportunities".

In contrast, the teachers in Case Study Two do not meet the requirements of this principle. The findings indicate the Centre only specifically worked with or taught children about ICT when it was a focus of their individual programme or children

seek assistance. ICT in this case had been made available in the environment (during restricted times) and children were expected to remain interested even though their learning was not being extended. Similar findings were found by O'Hara (2008), who advocates that if teachers limit their role in guiding children's learning, the full benefit from the learning experience is not received. In addition, although the approach is consistent with providing the stimulating environment that is typically advocated in learner-centred or constructivist early childhood curriculum (Scott, 2008), the approach is not consistent with socio-cultural approaches to learning, in that it only provides one of the necessary conditions that Vygotsky identified for learning to occur: access. Vygotsky (1978) argued that children require both access to resources or cultural tools and mediation by more capable adults or peers for learning to occur.

Another tension exists between competing and co-existing approaches to learning as teachers discussed the importance of relationships and advocated the use of peer tutoring as a strategy for learning. Where appropriate, the teachers also talked about scaffolding children's learning, which may involve teaching them a specific skill. However, while constructivist and social-constructivist approaches are evident within the teachers espoused approach, it is important to note that most interactions with ICT involved a didactic approach to teaching and learning suggesting a clear conflict between beliefs and actual practices. The actual approach taken suggests a behaviourist approach, consistent with social efficiency models of curriculum (Scott, 2008), in which the teacher has a set of preconceived learning outcomes which guide the child's learning.

A social efficacy model of curriculum is in some conflict with the learner-centred constructivist ideology currently advocated within *Te Whāriki* or with more recent writings in early childhood from a sociocultural-historical perspective (Anning, Cullen, & Flear, 2009). Early childhood teachers draw on a range of teaching approaches to inform their professional practice and this behaviourist approach is only one. However, there is evidence to show that teachers often utilise this didactic teaching method when they are under pressure (Leask, 2001). This pressure might also include having limited knowledge of how to facilitate more relevant approaches to ICT learning.

The literature review established that some groups believe a more relevant approach to facilitating the use of ICT would be to integrate it into the ECE programme “physically, functionally, and philosophically” (NAEYC, 1996, p. 2). Utilising their ICT pedagogical knowledge, teachers should infuse technology throughout the curriculum and draw on it, as and where appropriate (Davis & Shade, 1999). However, this view was not evident in the approach that teachers adopted for their centres in this study. Teachers from both centres indicated that they wanted to set up an “ICT area” where computers, scanners and other “office type equipment” could be located. While there is a practicality issue related to using ICT with young children, designating a specific ICT area has been critiqued over time (Downes, Arthur, & Beecher, 2001; O'Rourke & Harrison, 2004; Yelland, 2001). When the purpose of a separate ICT area was explored a view was presented that “you can just keep a better eye on electronic equipment if it's all located in a place”. So whose needs are being served here? As Bridget commented:

*I think it's just that everything can be located close by rather than having something over there and something over here. ... a lot of it's to do with the power points and the fact that you might get paint or dough or water on a piece of equipment. I mean I think you can just keep a better eye on electronic equipment if it's all located in one place.*

For ICT to be of most benefit to children it has been strongly advocated that it should be used flexibly and to be fully integrated into children's play (Downes et al., 2001; O'Rourke & Harrison, 2004). It could also be asked if this approach fits with the more traditional view of 16 separate learning areas that comprise the ECE programme, which guided ECE curriculum in New Zealand for many years (Somerset, 1991). Are these centres attempting to map ICT on to “the old curriculum, which was conceptualised in a different time” (Yelland, 2005, p. 206). In this sense, the findings contrast with Principal Two of an enabled and enacted ICT curriculum.

The physical placement of ICT in a designated area does not promote integrated, meaningful and authentic learning opportunities. When teachers have to stop the learning that is taking place to direct children to the ICT area in order to extend this

learning it would seem that this would be contradictory to good teaching practice. Put simply, ICT did not mesh well in the curriculum in the centres involved in this study.

In summary, it appears teachers draw on an eclectic range of theories to inform their practice but when using ICT they engage more didactic teaching methods. This contradiction may be the result of teachers having a limited understanding of how to facilitate an integrated and meaningful learning experience with ICT for young children. Teachers were exploring options of how they might offer ICT in the programme of learning, yet some approaches show evidence of attempting to fit a new learning experience into an old curriculum model. This section has identified the way teachers' beliefs are mediating and influencing their professional practice. The teachers' knowledge, skill and confidence also affect their beliefs. Therefore, ICT at this point is providing a small undercurrent to the metaphoric pond. It is providing an initial disruption to the curriculum but systemic change is not occurring. When reflecting on the principles proposed in Chapter Two as guiding an enacted and enabled ICT curriculum, it would seem that centres have some way to go before reaching a mature level of practice.

### ***Competing and co-existing drivers***

By delving beneath the surface, the findings help to reveal a strong vocational rationale, which is supported by both parents and teachers. To some extent, this rationale is also embedded throughout *Foundations for Discovery* (Ministry of Education, 2005). In the early childhood sector, preparing children for a world of work can be highly contentious, as many believe that the purpose of education is much broader and relates more to children becoming enthusiastic life-long-learners (Longworth, 1999). Similarly, Nash (1983) in his aptly titled seminal text makes the point that “schools can’t make jobs”. The interesting point is that both a vocational and life-long learning perspective share the same discourse, but for different purposes, as all education is in one form or another preparation for the future. Edgar and Edgar (2008) go beyond both perspectives by linking the importance of ECE, and therefore ICT, to the goal of education for citizenship.

*Most education policy is still driven by notion of investing in the future ... And there's nothing wrong with that – every nation has to survive and thrive. But the goal of mastery, of not accepting any child's failure, should be driven by more than economic arguments. It should be driven by the goal of ensuring every citizen an informed, engaged and meaningful life, a goal of education for its own sake. (p. 198)*

Ultimately, in a democratic society, the state or relevant funding agency has a responsibility to ensure that children are provided with the best possible learning opportunities. This includes the chance to become active and contributing members of society and productive citizens. To date, one could argue that ICT policy has been put forward as a convincing pretext for preparing productive workers and life-long learners rather than producing an educated citizenry. There is little or no evidence to suggest that teachers have been encouraged to take a bigger picture view of ICT and much of the focus appears to be on skill development, as evidenced by their response to the value of basic computer literacy. Of course, the fundamental tension is that basic skills are required to become both functionally and critically literate and there is a limit to the work that teachers can do with young children.

The important point is that basic ICT literacy skills can contribute to a child's ICT social and cultural capital. Through developing these skills in the early years children are provided with a strong foundation to build on when they attend school. Research by Tunmer, Chapman and Prochnow (2006) supports this view as they found in a longitudinal study that children's learning is directly affected by the literacy experiences they have prior to coming to school; what they term literacy cultural capital. Therefore, if access to ICT is unavailable in the home setting and the early childhood educational experience of ICT is substandard, then it would seem fair to say that children who enter compulsory schooling without this ICT capital will be disadvantaged compared to children who have had these experiences at home and in their early childhood setting.

### *Children and ICT*

A tension is evident in the results between the approach advocated in using ICT in the ECE setting and the need for the teacher to control it. The reason for use of ICT in the

ECE settings focused around empowerment. Children were empowered with the opportunity to engage with these “expensive” resources and through doing so their sense of achievement and independence skills would be fostered, alongside learning how to use the equipment. However, the teachers’ focus was on controlling the technology and the establishment of “rules” that were carefully monitored. These rules focused on the responsible use of ICT and the restriction of time, which seemed contradictory to children’s independence skills being encouraged.

During the interviews conducted with children in the kindergarten setting there was evidence of children being well informed about the technology itself and they were able to discuss both the various components and functions of the equipment. They talked about the use of ICT in both the kindergarten and home environment and clearly associated the rules guiding its use in each area. Children demonstrated an interest in the wider peripheral devices such as the printer, engaged in discussion about their favourite websites and expressed frustration when access was unavailable. It is not surprising to see that children’s focus on the use of ICT was centred on its function. Again we are faced with the tension between the children developing the basic skill and ability to become functionally literate and using these real tools for a real purpose, providing an avenue in which children can do meaningful things.

### *Teachers and ICT*

Teachers also had quite high expectations of what the technology could do for the children rather than what they could do with the technology. This mindset reflects the view that ICT sits separately to people and culture: it assumes that the use of technology equates to progress, a technologically deterministic view, and yet we know this not to be true (Williams, 1974). As established in the literature review this focus on technology is myopic and fails to attribute human agency. While acknowledging that having technology in the education environment can make a difference to children’s learning, it is important to remember that teachers’ pedagogical approach is what enriches this learning opportunity (Yelland, Grieshaber, & Stokes, 2000). The pedagogical approach is the enabler for educational advancement, as the use of technology itself does not equate to progress.

ICT has been highlighted through the data as a tool for communication and a change agent (e.g, fostering independence, achievement and skill), yet it is not being used in this way in ECE. Teachers in this study had not consulted widely with parents about the centres' approach to using ICT with young children. As previously stated, parental involvement in ECE is strongly advocated within *Te Whāriki* and supporting documents (Ministry of Education, 1996a, 1998, 2004). Ideally, involvement of parents in ECE should include shared decision-making (Siraj-Blatchford, I. et al., 2002). That said, teachers involved in the case studies did not discuss the use of ICT in the centre with parents. In one case, a teacher suggested that to do so would raise the status of ICT and would be "like opening a can of worms". Teachers stated that parents trusted their professional decision-making and while many parents made no comment at all about the programme, those who did were supportive.

#### *Parents and ICT*

On the other hand, parental support for ICT appeared to be motivated by different factors. More than half of the parents indicated that they thought ECE services should have access to ICT. However, when compared to other sectors in education, ICT in ECE was viewed as being of least importance. Once again, there is reason to conclude that ICT is viewed as affording some type of vocational advantage and this is perceived to increase as children progress through the education system. This perception may be being fuelled by the Government's recent policy focus on ICT in ECE. Running parallel with this is the media exposure that surrounds such initiatives (Mallard, 2005a, 2005b) and the rhetoric surrounding the knowledge society (Gilbert, 2005).

A high percentage of the parents in the study also indicated that they were unsure whether ICT was important to young children's learning. Yet if a true partnership approach underpinned these education settings then teachers would have actively engaged parents in exploring the possible benefits and / or drawbacks of using ICT with young children. Therefore, ensuring parents have adequate knowledge of ICT to inform their views is important when engaged in shared decisions about the purpose and place of ICT in ECE (Stacey, 1991). Teachers, however, reported that parents

had not questioned its use. Healy (1999) suggests this apathy is because parents choose not to ask those critical questions about how and why these technologies are benefiting their children. Having said that, a number of parents also expressed concern over the use of ICT by their child and stressed the importance of children “learning the basics” first and having the opportunity to learn through play versus teaching technology for the future. These findings are consistent with the concept of new moral panic and congruent with the results from the *Evaluation of ECE ICT Professional Learning Programme* (Cherrington, et al., 2009).

Parents also indicated that they did not feel well informed about the wider safety issues when using ICT with young children. They were also unsure whether ICT played a role in children’s socialisation and any potential learning opportunities afforded to children through the home use of ICT. The key point is that not all parents felt comfortable and knowledgeable about their child’s use of ICT both in the centre and home environment. This finding concurs with Ham’s (1990) conclusion that many parents were unclear about the precise value of ICT in their child’s education. More than two decades ago, Ham identified this as a challenge and called on educators to assist parents in their developing understanding of the role and potential of ICT in the lives of children. It appears on the basis of the present study that little progress has been made. A lack of knowledge greatly affects how parents can engage in critique about the ongoing use of ICT in ECE. Overall, the findings indicate that centres have not started on the journey to achieve Principles One and Eight of an enabled and enacted curriculum, which focus on working in partnership with parents.

However, it is important to remember that parents themselves may be in a period of transition, as they increase their own skills and become accustomed to their digital native offspring being more ICT capable, comfortable and knowledgeable. Thus, assisting parents in furthering their understanding of the role and potential of ICT in children’s lives remains a work in progress. If centres were working in true partnership with parents, they would be providing them with access to information about possible benefits and challenges of using ICT in ECE. Of course, such an approach is dependant on teachers having a clearly established ICT pedagogy and shared philosophy in the ECE centre.

In summary, there are a number of competing and co-existing drivers affecting the successful integration of ICT into ECE programmes. For example, the focus on the development of skills, tension between ICT as a tool for empowerment and teacher control and the focus on technology as progress rather than pedagogy. All stakeholders clearly have a view about these new phenomena in ECE but there is a lack of a singular understanding of why ICT is important within the ECE sector. The research highlights that not all perspectives have equal weight in this discussion and the relative immaturity of ICT in the sector conflicts with the partnership approach currently advocated in ECE in New Zealand today.

### *Literacy in transition*

On a positive note, there is evidence of children acquiring new forms of literacy through ICT learning experiences. Teachers frequently discussed making use of digital photos in the documentation of children's learning and in the way they communicate messages about the programme to parents (e.g., wall displays, slide shows and newsletters). Children were also being encouraged to explore the technology and subsequently document items of interest to them. These images were then used as a prompt for children to reflect back on prior experiences, relationships and learning that has occurred. The Kindergarten had also been exploring the use of ebooks with children involved in narrating their digital pictures and engaging in meta-cognitive practices. Teachers in the Kindergarten demonstrated a more mature level of practice in relation to Principle Six of an enabled and enacted curriculum than the Education and Care Centre as they actively explored new ICT initiatives and engaged in reflective practice. The changing face of literacy is clearly evident in these early childhood settings. In the Kindergarten environment, where children have a greater level of access to ICT, they appear to be developing new skills, knowledge, and dispositions that demonstrate creativity and persistence.

However, what is of concern is that those involved in the study did not refer to the concept of critical literacy (Comber, 2003) at any point. Critical literacy is an important skill that could be modelled in the ECE environment. Encouraging children to think about and question the content of a website or educational software and the

messages being transmitted can assist them in developing the ability to engage in critical literacy. When considering ICT in ECE engaging children in critical literate practices appears to be a missing essential component of the ECE programme. This means that children are not being supported in developing skills for life-long learning and in using ICT to promote citizenship and skills for life, thus demonstrating that these centres are at an immature stage of reaching Principle Nine of an enabled and enacted ICT curriculum. Through weaving this component into the use of ICT in ECE it would ensure that literacy and curriculum issues are emphasised rather than the technology itself (Lankshear, Snyder, & Green, 2000). This approach may also assist teachers in the further integration of ICT into the programme of learning and facilitate emancipatory change.

Notably, children using ICT to become critical consumers was viewed by parents and teachers to be the least important skill to develop in ECE. Critical thinking is an approach that enables children to think at the highest level of their capability. People who adopt critical thinking continually problem solve, question taken for granted assumptions and challenge conventional interpretations of data. This is because it is the place of critical theory to generate new forms of knowledge, particularly those “shaped by social interests which are democratic and egalitarian” (Friesen, 2008, p. 174). Its purpose is transformative: to help to improve the understanding of society in order to make positive changes. This approach can be applied in ECE particularly when using ICT. Brown and Murray (2006) advocate that real benefits occur in learning when we move past the focus on the technology itself and develop the ability to “critically read the nature of technology” (p. 47). They stress that ICT is not neutral and teachers can support the development of more generative knowledge by talking with children about hidden messages “conveyed and promoted through digital technologies” (p. 47). The key point is that there is a difference between society and education being in change, so ICT must be incorporated in the education system versus using ICT to change the education system. Doing so will assist in developing a fairer and more equitable society.

This depth of thinking about ICT was not obvious in the examples that teachers provided in the case studies. Arguably, teachers took a didactic or instrumentalist

approach to using ICT with children following the general approach in the sector. They identified their role as supervising the use of the equipment, demonstrating specific skills and instructing children's use of ICT. Teachers suggested that this pedagogical approach was taken because of the expense of the technology and also because children were not reading fluently. Teachers also talked about the specific skill set that was required by children in order to use the technology successfully. However, one could ask in a time of rapidly changing technology how the development of this chosen skill set is going to enhance a child's literate cultural capital (Larson & Peterson, 2003).

A more appropriate response from the sector would be to foster the knowledge, skills, and attitudes required to be a life-long learner through ICT as clearly it will be an important part of the future. Such life-long learning characteristics would include being a problem solver, a risk taker, curious, questioning and critical, and children who enjoy learning (Gunasekara & Collins, 2008). Teachers need to model such an approach by situating the learning and ICT in authentic and meaningful learning opportunities which can further develop children's knowledge, skills and attitudes. However, it would seem that both participating centres had not considered how life-long learning could be fostered in children where they learn how to learn with and through ICT, suggesting that they are yet to embark on this journey of reaching Principle Seven of an enabled and enacted curriculum.

This line of discussion raises the concept of digital or technological literacy. According to Lankshear, Snyder and Green (2000), technological literacy has "technical, organisational and cultural dimensions to it" (p. 33). A technologically literate person would therefore, understand what technology is, how it evolves over time and "shapes society, and in turn is shaped by society" (Petrina, 2007, p. 190). They would be able to recognise and articulate the capabilities and the limitations that technology has to offer society and as previously stated the relevant knowledge skills and attitudes, which one would expect ECE teachers to model and foster in children.

It is noteworthy that while this skill was ranked highly, teachers did not actually make reference to these skills when asked what learning was taking place when children

were working at the computer. In the first case study, Bridget did make reference to children having the opportunity to use the mouse and keyboard, though most teachers spoke more generally about this topic (e.g., waiting for a turn and manual dexterity). Most teachers saw ICT in terms of functional literacy, which may or may not be appropriate given the age of the children – depending on the ethos of the centre and its longer-term goals. The failure to articulate what ICT should be used for may be an outcome of the holistic programme advocated in *Te Whāriki*, (Ministry of Education, 1996a), as the curriculum does not advocate specific skills to be learnt. While ICT skills are valuable for children to develop, notably teachers either shied away from, or were unable to articulate the actual technological learning that may be taking place. This finding concurs with Patterson’s (2004, p. 29) research which suggests that “teachers were unsure or tentative about what children were learning when using ICT” and may reflect a reluctance by teachers to ‘educationalise’ ECE. Similar findings were evident in an earlier study by McLachlan-Smith (1996) who investigated teachers’ and parents’ view of children’s literacy development in New Zealand kindergartens. This study found that teachers often refrained from actively teaching children literacy skills because they were unsure if it was part of their role.

Over the last decade growing debate has taken place about teachers having adequate domain knowledge (Cullen, 1999; Garbett, 2003; Haynes, 2000; Hedges, 2002). A focus on subject knowledge is apparent in a number of Ministry of Education commissioned reports (Cherrington & Wansbrough, 2007; Farquhar, 2003; Mitchell & Cubey, 2003) which have highlighted the importance of domain knowledge. Cherrington and Wansbrough (2007) in their report on professional development programmes show clear evidence that ICT is one of these subject areas about which teachers are seeking more information and guidance. Although domain knowledge is important it is imperative that functional use of ICT is coupled with a strong pedagogical focus to ensure that transformation of practice occurs.

The focus on functional literacy evident in this research is not new to education (Dakers, 2006). Arguably, teachers would provide richer learning opportunities for the child if they used ICT to develop a critical awareness of how technology shapes the world in which they live. As previously stated, Brown and Murray (2006) provide

an interesting example of engaging children in learning that uses ICT as both a “tool and topic” (p. 47) to critically explore advertising. However, many teachers in ECE seem to be locked into the idea that any learning opportunity must originate from the child as this approach links strongly with the standard mantra from *Kei Tua o te Pai: The Early Childhood Exemplars* (Ministry of Education, 2004a) of “notice, recognise and respond” (p. 6). As established in the literature review, this reluctance by teachers to offer a broader understanding of ICT may have been because they did not perceive this type of learning to be of significance (Nuttall, 2005b). Using the current assessment approach advocated in ECE (Ministry of Education, 2004a), teachers hold the power in deciding what is significant learning for the child and if ICT is not an area of learning that is understood or valued then it can be overlooked and children’s learning can plateau. This is evident in the Education Review Office (2007) report, which shows that teachers are not adequately supporting children’s interests, experiences and dispositions through using current assessment approaches. Moreover, in half of these ECE services assessment information was not being used to inform the learning programme.

In summary, the findings underscore the importance of teachers modelling the diversity of ways in which literacy is constructed. In the Kindergarten particularly children are encouraged to participate in these multimodal ways of learning. The functional use of the technology, while essential, does appear to override other possible learning opportunities. Both centres have supported children in developing multi-literate skills, therefore achieving Principle Five of an enabled and enacted curriculum. The dilemma now is how do they facilitate the use of ICT to promote citizenship and skills for life? (Principle Nine). By taking this approach, education can reside in the foreground, rather than the technology, and this may potentially alleviate some of the tensions that teachers have experienced over the use of ICT in ECE.

### ***Key role in professional development***

Returning to the pond metaphor, professional development is an essential ripple to keep the pond fresh and full of life. It is through a programme of professional support

and guidance that teachers can reflect on their vision for ICT, their pedagogy and also to have the opportunity to learn new skills. Having sufficient knowledge of the technical aspect of using the hardware and software, and knowledge of how to integrate ICT into children's learning in meaningful and authentic ways is of the utmost importance in ECE. Professional development and access to this was raised by the teachers in the Education and Care Centre as an area of concern. They were relatively unaware of any professional development that had been offered in their area that would meet their centre's individual requirements.

There is some evidence to suggest that while whole centre participation in any professional development offered is an important element in shifting practice (McLachlan-Smith, Grey, & Haynes, 2001; Mitchell & Cubey, 2003). This is because when entire teaching teams participate in professional development opportunities they develop a shared understanding and a consistent approach to the programme delivery (Mitchell & Cubey, 2003). Similarly, Fiszer (2004) argues that changes in beliefs and practices do not occur unless teachers engage in reflective practice, trial and error and repetition, in the context of support from others who are facing similar challenges.

In this study it is important to point out that the commitment to professional development that focused on the pedagogical and technical use of ICT in ECE (Principle Ten) varied considerably. The teachers from the Education and Care Centre reported that they found greater difficulty in accessing appropriate professional development courses. Daisy acknowledged that if the team had a chance to attend professional development courses then this would provide the opportunity for debate to occur about the use of ICT. She then commented that "you can't really have a professional dialogue here because we are already doing as much as we know, we don't really know much else". This is one of the tensions in the use of ICT in ECE services. It is the 'chicken and egg' scenario where you require the resources in order to offer them in the programme of learning. However, if there is not a shared pedagogical focus, ICT in the centre can become like the 'pink elephant' in the middle of the room - the thing that nobody talks about. This appeared to be the approach taken by one of the teachers from the education and care centre involved in

the case study who shared that she would use ICT if children were interested. This statement was followed by the comment that in her experience she did not believe children were interested at all in ICT. Therefore, it could be asked why have ICT available in the centre at all if it was not of interest to children, or was the computer simply being used as a marketing tool to assist in the recruitment of families to the centre?

In comparison, the Kindergarten teachers had reached a greater level of maturity in their practice than those working in the Education and Care Centre. Kindergarten teachers were engaged in ongoing learning about ICT (Principle Ten) and all teachers, although at varying levels, articulated their commitment to using technology with children. The Kindergarten Association supporting this Kindergarten does have a strong infrastructure in place to provide professional support and guidance to their teachers in all areas that they offer. Possibly this ongoing support has assisted the Kindergarten teachers reaching a more advanced level of maturity in their practice. On the other hand, the time provided by the sessional nature of the Kindergarten and the school term structure may simply mean that more time for professional development has been available and used to support teacher knowledge in this area.

However, centres that are open for extended hours of operation and have larger teaching teams may find it challenging to negotiate and coordinate a shared professional development focus and to access professional development opportunities that best suit their individual requirements. Further issues that may impede a shared professional development focus might include staff workloads, time, dysfunctional teams and turnover of staff (Cherrington & Wansbrough, 2007). Within any professional development that is offered it would seem imperative that teachers have the opportunity to develop an understanding of the policy direction and the wider safety issues of using ICT with young children, to discuss and debate their own views of ICT and to consider what a shared philosophy and teaching approach might look like in their centre (Oldridge, 2008). It is essential to develop this pedagogical knowledge alongside the technical aspects of using ICT (Cox, Preston, & Cox, 1999).

There is little evidence to suggest this type of professional engagement has occurred in the centres involved in this study. It is noteworthy that although two Kindergarten teachers had engaged in Ministry of Education funded professional development opportunities (focusing on ICT), and a teacher from the Education and Care Centre was in the final weeks of completing an ECE qualification, none had been exposed to the ICT framework. What this suggests is that while there is some commitment to ongoing ICT professional development, the ECE sector itself may not have yet reached a mature level of practice as reflected in Principle 10 of an enabled curriculum: “Teachers have an ongoing commitment to professional development that focuses on both the pedagogical and technical use of ICT”.

Moreover, one could also question whether the programme of ICT professional development offered to the ECE sector has reached this level of maturity. This point is supported by the recent ICT evaluation of the effectiveness of the ICT professional learning programme (Cherrington et al., 2009). The funding for this programme was a direct outcome of the ICT framework *Foundations for Discovery* (Ministry of Education, 2005) and was intended to build professional capability and research. Although this project was half way through its implementation cycle of three years one of the report’s findings was that a “stronger focus on the pedagogical implications of using ICT with children should be incorporated into the programme” (Cherrington et al., 2009, p. 108). This conclusion is noteworthy, considering the programme has had substantial funding and professional development for its facilitators yet a gap still appears to exist between the needs of the ECE sector and quality learning outcomes for children. This professional development programme is, at this time, unable to offer the challenge that some early childhood teachers are seeking, as evident in the quote below (Cherrington, et al., 2009, p. 85) and as the findings of this research support.

[I] would like to be more challenged on pedagogy as to date I feel this programme has been focused on bells and whistles of ICT and not pedagogy. No link has been made between skills and pedagogy. The service has been asked to engage in academic research but not academic discussion.

This report (Cherrington, et al., 2009) also identifies that using cluster groups for professional development provides many benefits, including sharing of skills and knowledge and practice for disseminating research. Through doing so ECE centres have begun to foster their own community of practice. Importantly, clustering of ECE services is particularly beneficial when centres are geographically close and there is a reasonable degree of homogeneity among the centres participating in the professional development.

In summary, access to professional development that focuses on both the functional use of ICT and ICT pedagogy is imperative if transformation of practice is to be achieved. The challenge is how this can be achieved in a diverse ECE sector that has a multitude of issues to overcome (e.g., no shared non-contact time, unqualified staff, high staff turnover) coupled with the apparent gap in expertise of the ECE ICT facilitators (and providers) who offer professional development. While clustering of ECE centres may provide an avenue through which to offer ICT professional development there are clearly wider issues that need to be taken into consideration when constructing such a model.

### ***Barriers to full integration of ICT***

Teachers involved in the case studies identified that ICT can be used to enhance children's learning and are endeavouring to explore ways in which they can integrate its use into the learning programme. Although, as the case studies show, this integration is at varying levels.

Whilst endeavouring to integrate ICT into the curriculum teachers identified a number of barriers, which impact on the programme that they offer or aspire to offer. These barriers included having the time to work alongside children in supporting an ICT interest, the financial constraints of resourcing ICT in the centre, technical support, broken equipment and issues with space and accessibility of the equipment. Similar findings were also evident in other New Zealand-based research which looked at the use of ICT in ECE (Cherrington et al., 2009; Depree & Hayward, 2004; Williamson, 2005).

Williamson (2005) identified that a lack of technical support is an issue for centres. Teachers in this study indicated that if something broke down they had to approach a sympathetic, knowledgeable parent or wait for the management of the centre to have the item repaired or replaced. This could take some time and teachers acknowledged that if management does not actually work with children and parents then they fail to recognise the significance of using ICT to document and extend children's learning. However, one could ask if this a reflection on the teacher's ability to articulate clearly the possible benefits afforded by the use of ICT?

Further issues identified related to the environmental set-up, accessibility and positioning of equipment. The lack of space, power points, internet access (usually only available in the office) and trailing power cords were identified as areas of concern by both ECE services. Having no technical support meant that expensive mistakes were made by teachers regarding the interoperability of hardware when purchases were made.

Time was also identified as an important barrier; teachers indicated that they were unable to spend time working alongside children who were engaged in using ICT resources. Working alongside children supporting and extending their interests is an approach that is advocated in ECE in the New Zealand context (Ministry of Education, 1996a, 2004); therefore, it could be questioned why or how teachers manage to find the time to do this in other curriculum areas but not when children are using ICT. It is also noteworthy that teachers reported that they generally did not engage in using ICT to record assessment of learning with children in the main playroom. For instance, Angie said that while that idea had merit, their teaching team often thought that this was "teachers' work" and should not be done during session hours:

Angie acknowledged that the team had talked a lot about this mindset and that it could be timely to revisit again. This is an interesting position given the ECE curriculum is defined as the "sum total of the experiences, activities, and events, whether direct or indirect, within an environment designed to foster children's learning and

development” (Ministry of Education, 1996a, p. 10). Therefore, working together on any learning experience could be seen to be a valid and worthwhile learning opportunity (Oldridge, 2008).

The perceived barrier of time (or workloads) mirror those previously identified in early childhood research focusing on professional development (Cherrington & Wansbrough, 2007; Gaffney, 2003). This area of concern is not only evident in the ECE sector. Teachers in the compulsory sector have struggled for sometime with this issue (Ingvarson et al., 2005) and are also finding ICT impacting significantly on their workloads (Ham, 2009). The use of ICT in education has been linked to reducing teacher workloads in international literature (British Educational Communications and Technology Agency, 2004; PricewaterhouseCoopers, 2004). Findings from these studies suggest that teachers need to be competent in the use of ICT before gains can be made in streamlining administrative tasks, which can then save time to reinvest back into the learning programme. Moreover, if teachers are not competent and confident in the use of ICT, then these tasks are time-consuming and sometimes frustrating for the user (British Educational Communications and Technology Agency, 2004). Teachers in this position may not be at the stage of realising the advantages to using ICT in their teaching and professional development needs to be designed with this problem in mind. When teachers are aware of the benefits of using this technology then they are more likely to persevere (Cox et al., 1999) and in the long-term realise time saving benefits.

The extra cost involved in resourcing ICT was also an issue identified which greatly inhibited what and how ICT could be offered. It remains clear that although the level of access to equipment has grown this issue remains unresolved (Brown, & Dougherty, 1994; Podmore & Craig, 1989; Williamson, 2005). Teachers in the field view funding for ICTs as a major challenge for centres and this is the reality faced every day. Kindergarten teachers indicated that they were proposing to take the lead in applying for grants for ICT resources, as these were so expensive. This indicates that they assign an extraordinary status to the provision of ICT in their centre, which may provide mixed messages to the community of the value of ICT in regards to other curriculum areas. Competing tensions are also evident here about the value placed on

ICT in comparison to other learning opportunities. This also requires more of the teachers' time (already a precious resource) in completing applications for funding and implicitly sends a message to their community about how important teachers view ICT to be.

As previously discussed, seeking community grants and assistance to fund ICT resources is not a new approach in ECE. However, currently the world is experiencing a major recession and this is already affecting the charity sector, with less money being made available by businesses for not-for-profit services (De Jong, 2009). As this funding diminishes the digital divide between those who have access to ICT and those who do not will continue to increase. Will this result in ICT being shelved until economic times improve and centres get back on the ICT roundabout? Or will it mean that greater inequalities in opportunities for children develop?

In summary, while the rhetoric surrounding the many benefits afforded to teachers and children using ICT in ECE remains loud and clear, as the stone hits the pond and has an immediate effect. The reality of this is that teachers are struggling with many aspects of ICT in the educational setting. The rhetoric and metaphoric ripples of the surrounding ICT pond are in stark contrast to the reality of integrating ICT into teaching and learning. A strong infrastructure is imperative for teachers to progress the use of ICT in ECE. The Kindergarten involved in this study was supported by an overarching association, which assisted with an ICT infrastructure. This meant they had reached a greater level of maturity with regards to Principle Four of an enabled and enacted curriculum, although this maturity was still developing.

### *Understanding the policy landscape*

Policy forms the outer layer of the metaphoric pond and potentially has enough force to create an ICT wave and subsequently affect how ICT is offered in ECE. The Literature Review established how *Te Whāriki* has been both acclaimed and critiqued by many in the field of ECE.

As Cullen (2008) summarises:

Because Te Whāriki is principled rather than prescriptive nature it relies heavily on teacher qualities to guide teaching practices. Hence it attracts an ideological commitment from teachers, rather than a primary focus on programmes that are grounded in evidence of children's learning. (p. 10)

The findings support this view. Teachers generally endorsed the non-prescriptive nature of *Te Whāriki* and suggested that at no point would they want to be told that ICT was a requirement of an ECE programme. In this regard the holistic approach that underpins the curriculum provided teachers with the option of including ICT in the programme or not offering it at all. Put another way, the holistic and open-ended nature of the curriculum allowed teachers to link ICT to the principles or strands in *Te Whāriki*, which would therefore justify its existence within the centre environment. In much the same way, teachers were able to justify the omission of ICT because of its tenuous status with the curriculum.

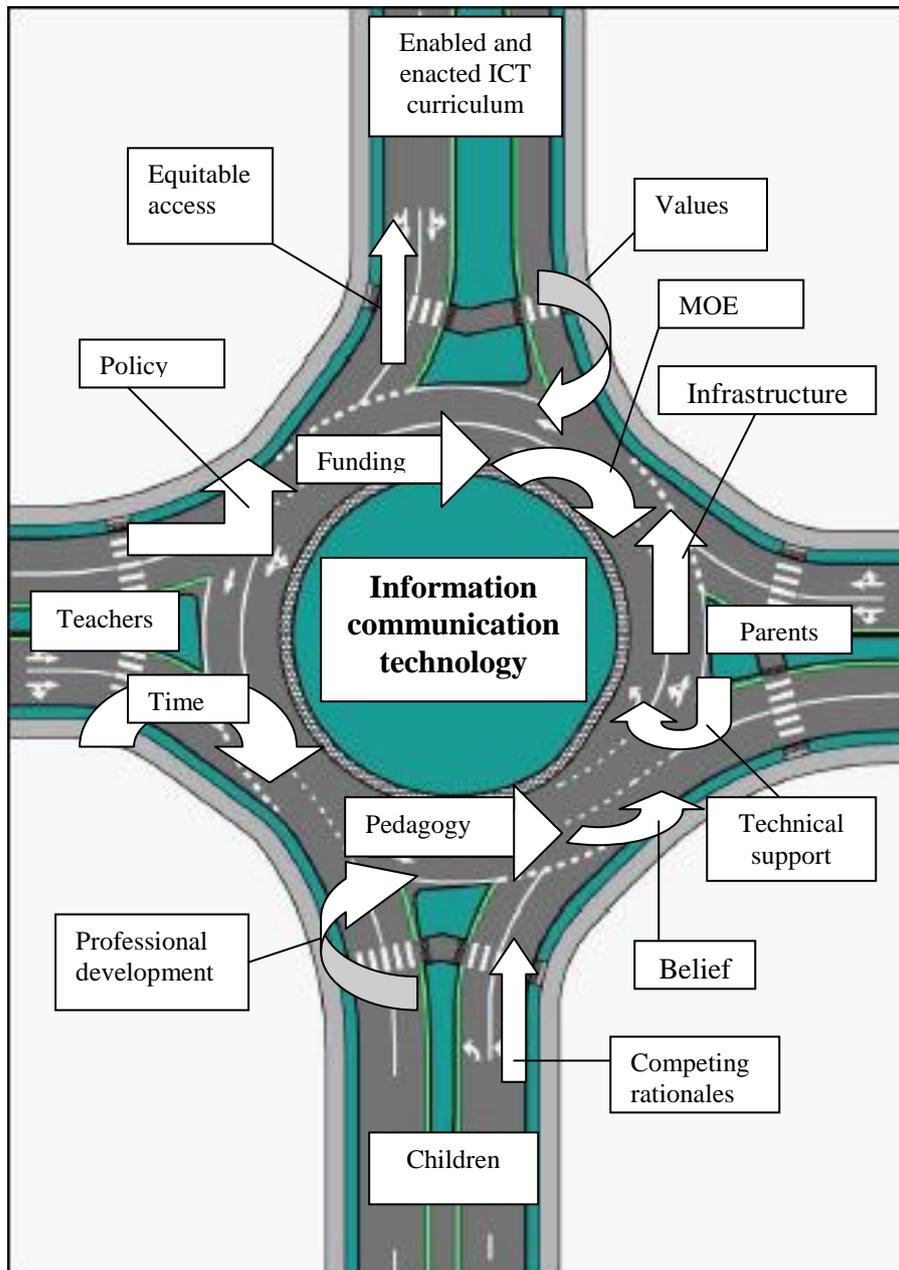
The key point is that the lack of explicit guidance or reference within *Te Whāriki* (Ministry of Education, 1996a) supports opposing perspectives and therefore vastly differing practice. This inconsistency has major implications for the knowledge, skills and social capital with which children will enter formal schooling and hence is an equity issue for children. Indeed, the issue provides strong grounds for a major revision of the curriculum in the near future. The findings provide clear evidence that curriculum integration does not occur by osmosis and the current policy landscape is unlikely to advance the Ministry of Education's ICT agenda.

The major pathway by which ICT appears to have entered ECE programmes is through assessment practices (Ministry of Education, 2004a) developed to support *Te Whāriki* (Lee, Hatherly, & Ramsey, 2002). Ironically, this backdoor pathway to ICT appears to have, in turn, provided the impetus and opportunity for the Ministry of Education to engage in more formal policy formation.

As identified earlier, if the purpose of the ICT framework *Foundations for Discovery* (2005) was "to provide guidance to inform effective ICT development, use and

investment in the sector” (Ministry of Education, 2005, p. 2), then it would seem that the impact of this document has been minimal. More to the point the Ministry of Education has failed to get the ICT message across to rank and file teachers. As Brown and Murray (2006) so clearly assert, if ICT is seen as such an imperative in education then surely “the nation-state has a key role in the provision of ICT in ECE in a way that is fair and socially equitable” (p. 45). Evidence suggests that barriers such as lack of ICT funding, infrastructure and appropriate professional development have remained the same for over 20 years and continue to be of concern today (Brown & Dougherty, 1994; Podmore & Craig, 1989; Williamson, 2005). Until an adequate level of funding / brokering and technical support is provided to ECE services, then history suggests there will be no change and centres and kindergartens will continue to remain trapped on the ICT roundabout as illustrated in Figure 7.2. This study has illuminated the competing issues that surround ICT and the importance of addressing these. If the Ministry of Education continues to “patch” these issues (e.g., by providing policy and no infrastructure) by only addressing parts of the problem, then by analogy, without signposts to identify a clear direction we remain trapped on a complex roundabout at a major intersection. Worse still, centres potentially could end up bouncing from one ICT barrier to the next and never actually leave the roundabout therefore never fully integrating ICT into the programme of learning. Albeit overly simplistic, the metaphor helps to convey the complex issues that affect the direction taken.

Figure 7.2  
The ICT roundabout



Adapted from City of Princeton, Minnesota (n.d.)

The message that emerges from the study is that adequate and equitable access is required for hardware and software to provide a robust ICT infrastructure. Clearly this infrastructure (Principle Four) cannot be provided solely by teachers; centre management, the community and the Government play a crucial role in facilitating or hindering the ongoing use of ICT. The lack of guidance evidenced in *Te Whāriki*

(Ministry of Education, 1996a) and *Foundations for Discovery* (Ministry of Education, 2005) coupled with the lack of any direct funding contributes to a rudderless direction, as the waves become nothing more than a ripple. The challenge we face is striking a balance between allowing centres to (a) set their own curriculum and (b) choosing if ICT might be included and how (Ministry of Education, 2005). If adequate provision was made in supporting technology in ECE teachers could not use this lack of access to justify sitting on the fence and not making a decision either way.

### **Summary**

This chapter has provided a synthesis of the results and identified the key differences between the two case studies. It discussed how complex and deeply entwined the issues are with the successful integration of ICT into ECE. The metaphor of the pond was introduced and the chapter discussed how the ripples made by the initial introduction of ICT have receded and little or no lasting change is evident.

The ripples of the pond comprise of the various layers of support and guidance that would ensure that ICT could be used in a meaningful and sustainable way. This would include ECE having access to funding for ICT or initiatives (e.g., laptops for teachers) that ensure up-to-date equipment is available for use. To ensure the successful use of this equipment, technical support and guidance around ICT infrastructure is required. Access to professional development that focuses on both pedagogy and the functional use of ICT is essential in ensuring teachers remain challenged, supported and motivated in using ICT in their learning programmes. Of course, it would also be of benefit for teachers to be made better aware of the Ministry of Education's policy direction so they can influence the future of ICT in ECE.

Returning to pond metaphor, all of these supports and services need to align if the ripples of the pond are to have a lasting impact on the current disconnected islands of practice. In other words, individual centres and the ECE sector at large will only experience, through the current use of ICT, surface level changes to practice. The failure to address these concerns may lead sadly to a third wave of ICT in which history repeats itself.

Presently, however, what is evident is that some of the teachers who participated in this study seem to be “sitting on the fence” with regards to the value of ICT. Little guidance is evident with regards to ICT within *Te Whāriki*, and, therefore, ECE teachers can choose if and how to use ICT in their programme of learning. While this level of control afforded to teachers is commendable, it does enable teachers to opt out of ICT or to physically include it in the centre but to pedagogically ignore it.

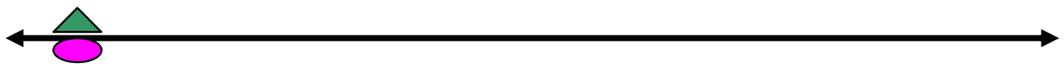
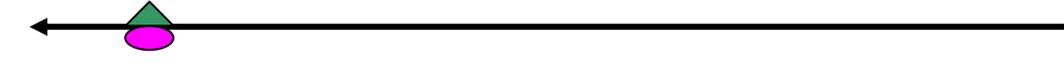
Currently, the use of ICT has yet to deeply penetrate the learning and organisational culture of ECE. While ongoing access to relevant technologies continues to be of major concern for ECE and may be further impounded by the economic downturn, it is only one barrier. This research has shown that having ICT available in the centre does not equate to successful integration and authentic use. The most significant and influential factor continues to be the teacher. How the teacher feels about ICT and young children, how they engage with it, their functional knowledge of it, confidence in its use and pedagogical knowledge all contribute to making the difference in children’s learning. Yet evidence suggests that teachers’ views continue to be influenced by ICT rhetoric and competing and co-existing drivers identified in this research, resulting in mixed messages being given to children and parents about the value, purpose and place of ICT in ECE. Teachers, along with parents, show evidence of being in a state of transition. What is worth considering is how long this state of transition lasts, particularly since ICT has been on the ECE landscape since the late 1980s (Podmore & Craig, 1989) in New Zealand.

In this chapter, the principles of an enabled and enacted ICT curriculum have provided some “signposts” to judge how far the centres in the case studies have come on their ICT journeys as evident in Table 7.1. This extends on the traffic analogy and reports using a traffic light indicator. When reviewing the data it is clear that the Kindergarten is further along the pathway to achieving an ICT enabled and enacted curriculum, although this remains in its early infancy. Under the current circumstances any further change that occurs will be because of the interest, commitment and goodwill of the teachers concerned. The question is how long will teachers remain positive and motivated when excessive demands are made upon them and they constantly encounter the barriers they have already identified?

Table 7.1

*Relationship between each centre and the principles of an enabled and enacted curriculum*

**Key:** Kindergarten ▲ Education and Care Centre ●

Principles		The relationship between each centre and the principles
1	Teachers and parents are aware of, and engage in, robust debate around the value and purpose of ICT in the curriculum.	 <p><b>Red</b> <span style="margin-left: 150px;"><b>Amber</b></span> <span style="margin-left: 150px;"><b>Green</b></span></p> <p>Parents are not consulted about the use of ICT in ECE and therefore this may inhibit their ability to engage in robust debate. Teachers in both centres did not discuss ICT with parents.</p>
2	ICT is used in a holistic way to promote collaborative, meaningful and authentic learning opportunities.	 <p><b>Red</b> <span style="margin-left: 150px;"><b>Amber</b></span> <span style="margin-left: 150px;"><b>Green</b></span></p> <p>Kindergarten teachers integrate a range of ICT experiences that foster literacy and build on children's interests. In the Education and Care Centre the computer with preloaded educational software appeared to be the main use of ICT.</p>
3	Teachers' beliefs must align with the articulated philosophy and the educational culture.	 <p><b>Red</b> <span style="margin-left: 150px;"><b>Amber</b></span> <span style="margin-left: 150px;"><b>Green</b></span></p> <p>Teachers from both educational settings appeared to struggle with congruency in their articulated approach and concerns around the use of ICT by young children.</p>



Principles		The relationship between each centre and the principles
8	Parents and teachers work in partnership to advocate for appropriate technologies.	 <p><b>Red</b> <span style="margin-left: 200px;"><b>Amber</b></span> <span style="margin-left: 100px;"><b>Green</b></span></p> <p>ICT is not discussed with parents therefore no partnership around the use of ICT in ECE was evident.</p>
9	ICT is used to promote citizenship and skills for life.	 <p><b>Red</b> <span style="margin-left: 200px;"><b>Amber</b></span> <span style="margin-left: 100px;"><b>Green</b></span></p> <p>This approach is not evident at all in either of the ECE services.</p>
10	Teachers have an ongoing commitment to professional development that focuses on both the pedagogical and technical use of ICT.	 <p><b>Red</b> <span style="margin-left: 150px;"><b>Amber</b></span> <span style="margin-left: 100px;"><b>Green</b></span></p> <p>All Kindergarten teachers had participated in ICT professional development opportunities. Only one teacher from the Education and Care Centre had participated in any ICT professional development.</p>

Apple (1986) suggests that ICT is here to stay but we should ensure it is used for the right reasons; that what we do with ICT and how we use it is based on political, economical and educational 'wise' reasons. Reflecting on this study, teachers are in agreement that ICT is here to stay, although this is being driven from a technological deterministic viewpoint. It is not until teachers engage in research or well-conceptualised professional development that they began to reflect on what these political, economical and educational reasons are and how they relate to their programmes of learning.

The following chapter presents conclusions, from which implications are considered for stakeholders involved in guiding the use of ICT in ECE settings.

## CHAPTER EIGHT

### Conclusion

Computers won't make bad teachers into good ones, but choices in technology use reflect important philosophical differences and may change not only what we teach but also how we teach it. (Healy, 1999, p. 39)

This study set out to investigate how parents', teachers' and children's perceptions and practices of the use of information and communication technologies (ICT) in early childhood education (ECE) influences the educational programme offered.

The study was guided by the following research questions:

1. What is the nature of the ICT learning experiences young children have in the home and the ECE setting?
2. What are parents' perceptions of young children using ICT in the home and ECE setting?
3. What are children's perceptions of using ICT in the home and ECE setting?
4. What are teachers' perceptions of using ICT with young children in the ECE setting?
5. What issues, real or potential, do parents and teachers perceive with the introduction of ICT into ECE settings?

The conclusion reviews each of the initial research questions to reflect on the success of the study in meeting the research objective. In the backdrop of the theoretical and research based literature on ICT, this chapter shows how the study has contributed to new insight into the second wave of ICT in ECE. Implications are then considered for stakeholders involved in guiding the use of ICT in ECE settings, including teachers, parents, teacher educators and policy makers. Following this, the methodology and data collection methods are reviewed along with the limitations of the present study. Lastly, the key lessons to emerge from the study are summarised and new research initiatives identified to help extend our knowledge of this burgeoning area of interest in ECE.

### *The nature of the ICT learning experiences*

The research has shed considerable light on the question of the nature of current ICT learning experiences. In the home setting young children are exposed to a wide range of technologies with a more than half of the participating children accessing the computer for less than one and a half hours per week. When using the computer children most frequently engaged in using CD-Roms and playing educational games. Parents reported that they provided a high level of supervision during the time their child engaged in computer use.

Albeit a small sample, the research indicates that today's children are immersed in digital technologies in their homes. Children within the sample were active users of ICT and confidently control the technologies they choose to engage with. They use ICT in their play and through doing so there is evidence of working with multiple literacies, solving problems, applying new knowledge to new contexts, and making decisions. These are all valuable skills to learn in a society that is rapidly changing and essential in aiding life long learners.

In the ECE setting, wider access to ICT was made available to older children. The use of ICT was surrounded by a number of rules regarding turn taking, the time spent and the safe use of technology.

Because of the age range and large number of children attending these ECE centres this approach to using ICT may be necessary to ensure the resources are kept safe. Yet, this research has shown that those children who actively engage with ICT in the home setting could assist teachers in supporting others. This is an opportunity to draw on children's expertise and advance leadership. Children could support their peers and through using this approach to expand the use of ICT in ECE and in so doing build children's social and emotional competence. Currently this appears to be a missed opportunity in fostering communities of practice around and through ICT in a manner consistent with contemporary educational theory (Crain, 2004).

### ***Parents' perceptions of young children using ICT***

The research has successfully provided new insight into the question of parents' perceptions. Wide-ranging views were evident regarding children's home use of ICT. Of interest were a large number of parents who had no definite opinion as to whether computer use in the home environment was beneficial to children. Many parents were unsure about any potential value ICT offered in the ECE curriculum and almost half of the parents suggested that the money spent on computers could be better spent on other resources. A large number of parents also indicated that they believed the use of ICT was least important in the ECE sector. Overall, parents who participated in the study were not aware of the learning opportunities afforded through the use of ICT in both the home and ECE setting.

A traditional view of ICT would suggest that at different stages in children's lives technology might be more or less significant. Many of the parents who participated in the research expressed this view. Having said that, arguably, parents were making this decision with limited knowledge of any potential value ICT might have in enhancing children's learning; there is also evidence that a level of moral panic over the dominating role of technology in children's lives was influencing parents' views.

Albeit speculative, there appears to be a tension between the importance parents continue to place on children learning the basics of education and the value of giving their children a head start for the new digital world. The research reveals the dearth of dialogue between teachers' and parents over such important issues, which is no doubt a contributing factor in parents' relatively ill informed views of the value of ICT in ECE. Moreover, teachers' lack of explicit mention of this issue suggests they have limited understanding of how ICT can be used to engage children in learning which fosters the development of innovative, flexible and critical thinkers, which an emancipatory perspective advocates (Cohen et al., 2000).

### ***Children's perceptions of using ICT***

The research was unable to fully explore the question of children's perceptions, but it revealed that some were knowledgeable users of ICT and made use of many

peripheral devices in the home setting. Based on self-report data and documentary evidence, supervised access was made available to a small range of ICT on a regular basis in the centre. However, because of the rules surrounding such use, children perceived the use of ICT to be something special. It was apparent that the selected children had a very clear understanding of the rules surrounding the use of ICT in both their homes and the ECE service, and articulated these clearly and confidently. At times these rules overshadowed the actual use of the technology. The older children attending the Kindergarten were able to talk about the different components of ICT, generally used the correct terminology, discussed their favourite websites or CD-Roms and made frequent links between their home and centre use.

ICT was part of these children's everyday experiences. What this suggests is that some children bring to the ECE centre pre-existing knowledge and social and cultural capital about the use of ICT. According to socio-cultural theory, which underpins the early childhood curriculum in New Zealand (Ministry of Education, 1996), teachers should build on children's strengths and interests to further their learning. In order to translate this theory into practice teachers need to identify children's interests and strengths through observation of children and communicating with parents. Yet this approach was not evident in the data gathered with regards to ICT. In fact, if children showed too much interest they were encouraged to move away and try different learning experiences. In this regard, there was little evidence of current socio-cultural theory living in practice.

What counts as curriculum is clearly driven by the teachers. If an innovation does not fit with their values and beliefs then they can and do veto it. This is done through being teachers being selective in what they notice, recognise and respond to, in addition to having a tight control of the learning experiences offered. This results in teachers missing valuable learning opportunities to further children's strengths and interests.

### ***Teachers' perceptions of using ICT with young children***

The research was particularly successful in revealing teachers' perceptions towards ICT in ECE. It appears the perceived frequency of ICT use has increased over the past two years and all teachers identified their skills as emerging or proficient. Teachers perceived their role to be an instructor and supervisor of the ICT. However, a tension was evident between competing and co-existing approaches to learning in the case studies. While teachers advocated for models of learning congruent with the ECE curriculum, their practice took on a more behaviourist approach, which teachers often revert to when under pressure (Scott, 2008). However, this approach to curriculum does conflict with recent theorising and research on effective approaches for enhancing teaching and learning in early childhood settings (Anning et al., 2009).

The development of basic skills and computer literacy was identified as the most significant factor in children using ICT. While these are all valuable skills for children to be developing, it is noteworthy that teachers either shied away from, or were unable to articulate the actual technological learning that may be taking place. This approach also takes a strong vocational rationale which is about preparing children for a life of work. This again conflicts with the philosophical approach advocated in ECE relating to education being more about life-long learning. (Longworth, 1999). Teachers are struggling with ICT in the educational setting and their values and beliefs are influencing their practice, as a level of moral panic was evident.

### ***Issues that parents and teachers perceive with the introduction of ICT into ECE?***

The research was able to successfully explore some of the issues that parents and teachers perceive relate to the use of ICT in ECE. Teachers highlighted the most significant barriers as the lack of teacher time and the cost of the equipment. Funding for the ICT was seen as major challenge for centres. A further issue identified related to the environmental set-up, accessibility and positioning of equipment. The lack of space, power points, internet access (usually only available in the office) and trailing power cords.

More than half of the parents indicated that they had some level of concern over their child's future use of ICT. Reasons provided included inadvertently accessing inappropriate material on the internet, societal expectations and children missing out on learning through the outdoors and traditional play experiences.

Education is about preparing children for life. This includes teaching children about the cultural tools that are used by society at that point in time. Socio-cultural theory advocates the role that cultural tools play in mediating learning (Vygotsky, 1978). Therefore, it could be argued that in supporting children to become active and contributing member of society, teachers have a professional responsibility to scaffold children's skill of learning with and through ICT. In this sense, pedagogy through ICT goes beyond solely focusing on teaching children the mechanics of using technology. Many children bring to the education setting their own cultural capital of ICT and teachers could draw on this to add depth and complexity to their learning. Conversely, teachers have an important role to play in addressing the digital divide. Neither approach was evident in the ECE centres in this study. Teachers' focused more on teaching the functional skills required to use technology successfully. While these skills are important, an over emphasis on this may result in creating ICT technocrats rather than innovative, critical thinkers as proposed in the enabled and enacted curriculum for ICT.

### ***Contributions of the study to the literature***

This thesis makes a number of important contributions to the literature. Firstly, the perception that teachers have regarding the use of ICT by young children greatly influences the educational programme. Although teachers were "keen" to use ICT in their programme of learning it was clear that a level of anxiety and moral panic was continuing to influence their professional practice. Their beliefs directly affected what and how much exposure children had to ICT and it was not until teachers began to articulate their views about young children's use of ICT (in the interviews) that they began to become aware of them and the influence they were having on their professional practice.

Secondly, this study affirms that it is the pedagogical approach that is imperative in the successful use of ICT in ECE settings (Brown, & Dougherty, 1994; O'Hara, 2004; O'Rourke & Harrison, 2004; Yelland, et al., 2000). Results suggest that professional development that focuses on both the technical aspects of using ICT alongside of the pedagogical approaches is important in assisting teachers to examine their personal beliefs, skill and knowledge of ICT (Cox et al., 1999; O'Hara, 2004; O'Rourke & Harrison, 2004). This finding challenges the wisdom of emphasising pedagogical knowledge at the expense of technical know-how.

Thirdly, consistent with the findings by Ham (1990), parents were unclear about the possible benefits afforded to their children through using ICT in the centre or in the home environment, while continuing to help fund the purchase of these resources. Parents were unable to engage in shared decision making in these centres as teachers chose not to discuss the positive or negative implications of using ICT with children. The inability by teachers to engage parents in discussion about this issue is reflective of their level of professional knowledge about this area. Professional development opportunities that provide opportunities for teachers to articulate their practice would be of benefit (Gibbons, 2006) and may potentially lead to parents becoming more informed about how ICT can be offered in a meaningful and authentic way in ECE.

Fourthly, *Te Whāriki* (Ministry of Education, 1996a) provides minimal guidance regarding the use of ICT in ECE. *Te Whāriki* is an aging curriculum written at a time when ICT was not prevalent or topical. The lack of guidance with regards to ICT and the age of the curriculum suggests that it is timely for a revision to occur.

Although *Foundations for Discovery* (Ministry of Education, 2005) was written to guide the sector's use of ICT in ECE, it appears to have failed on the evidence of this study. The Ministry of Education released this framework to the sector and "targeted" professional development opportunities. This approach has resulted in *Foundations for Discovery* being of little consequence to centres. Professional development providers could have strengthened the use of this framework in the sector by weaving it through any professional development offered. This has not been the case, and therefore this framework has also provided little guidance in the use of ICT in ECE.

As previously stated, the ECE sector was consulted on the process of writing the policy framework. Clearly, if the Ministry of Education is going to release policy documents to the ECE sector then procedures need to be put in place to ensure that all stakeholders have a chance to become informed and actively contribute to the policy. Teachers could be informed of any implications of new policy initiatives through regional hui or meetings, the Education Gazette or professional development opportunities.

Funding of \$16 million was announced as part of the 2005 budget to support the implementation of *Foundations for Discovery*. As stated, targeted professional development was one aspect for which this funding was to be used. It is noteworthy that with the change of Government in 2008, and subsequent change in policy direction, the contract for the ICT professional development has not been renewed. Not only that, but all funded professional development for the ECE sector was finish at the end of 2009. In 2010, any professional development funded by the Ministry of Education now has to reflect the Governments' priorities for ECE. The focus is on early literacy and numeracy and this professional development must be targeted to priority areas (Ministry of Education, 2010). ICT is not identified as one of the Government's priorities therefore; it is not funded as professional development for ECE teachers'. This creates an additional barrier for teachers and will no doubt have an affect on the momentum that ICT has experienced in the sector. Potentially teachers could be up to their necks in an ICT swamp.

Fifthly, a number of barriers were identified in the successful implementation of ICT. Notably, the findings closely mirror a study conducted by Williamson (2005). The complex and currently disconnected nature of our ICT infrastructure is inhibiting any change. While the Government does not provide direct funding for ICT in ECE services it can be argued that it is timely for the Ministry of Education to give due consideration to what role it can take in brokering access to leasing / purchasing arrangements and cost efficient technical support. This argument is consistent with the findings from *ECE-ICT Professional Learning Programme Evaluation* (Cherrington et al., 2009).

### *The future of ICT in ECE*

ICT has been on the fringes of ECE for more than two decades. Its place has not yet been cemented into the curriculum, as it appears to have been in the compulsory sector. This of course is an outcome of a number of factors including a holistic curriculum, a non-mandatory ICT framework, a lack of funding and ICT infrastructure in the sector. Because of the mix of private and not for profit centres it is unclear whether this will ever change. In addition, with the implementation of an ECE curriculum that is based on socio-cultural theory there have been subsequent changes to teachers' pedagogy. However, these changes are not always evident in practice, as this study has shown.

One can only hope that forward thinking teachers, well grounded in contemporary educational theory, are endeavouring to find a place for ICT in the curriculum. But this study suggests many teachers are struggling to fully integrate ICT in the curriculum. Looking to the future, a socio-cultural approach to learning provides us with a key to link with children's interests and further this through a range of learning experiences inclusive of ICT. While doing so teachers need to be cognizant of how they can facilitate cooperative learning opportunities for children, where children can engage in scaffolding and co-constructing knowledge with their peers. Doing so may enhance emerging communities of practice (Wenger, 1998).

This research has proposed a framework for an enabled and enacted curriculum (see p. 77). It is not intended to be used as a checklist but does have potential in guiding teachers' thinking about learning with and through ICT. In many respects the study validates the basic principles of the proposed curriculum as a sound basis for further discussion about the role of ICT in ECE. This level of knowledge and critique is important when introducing something that has been as controversial as ICT in ECE. It is imperative that teachers are informed and are articulate in sharing this information with parents. Centres that already offer ICT in the curriculum could use aspects of this framework to review how well they are achieving quality ICT learning experiences for children.

What is clear from this research is many children are likely to have a range of ICT experiences prior to coming to an ECE service. These may be different to those that the teacher experienced as a child but they are all still perfectly valid. It is the teacher's role to provide learning opportunities that build on children's cultural capital and are meaningful to them in preparation for life-long learning.

### ***Reflections on methodology***

#### *Contributions of the study*

This study has highlighted the perception and practice of teachers', parents' and children's use of ICT in ECE and how it influences the subsequent programme offered. This is a timely and important study that informs an area of research locally and internationally where little data is available to guide practice. A mixed method approach has been used in this study. This was to gain data that is both indicative of possibilities with wider populations, as well as providing an in-depth understanding of teachers', parents' and children's perspectives of the phenomenon being studied, which is a relatively new phenomenon in ECE research.

Inviting children to participate in this study provided an opportunity for their voice to be heard in the gathering of this data. Two projective methods (photographs and artwork) were used during the interviews to actively engage children in the topic at hand. This removed the focus from the child and stimulated discussion with the researcher about the child's understanding and use of ICT. This was a worthwhile approach as it provided an insight into children's perceptions and practice of using ICT both in the home and the ECE centre.

The data collection process was successful in ensuring the voice of multiple stakeholders were heard and proceeded smoothly. Survey responses were returned in a timely manner and interviews were conducted according to the schedule negotiated with the ECE centres. This ensured that the research proceeded smoothly.

### *Methodological limitations*

A number of lessons can be learnt from some of the methodological limitations related to the study and these need to inform further research.

Two early childhood services located in a provincial city were involved in the case studies: an education and care centre; and a kindergarten. Future studies could incorporate a wider diversity of ECE services (e.g., Te Kohanga Reo, Montessori). These services could be located in both urban and provincial settings. This would enable insights to be gained from a range of cultures, ethnicities and socio-economic groups about the perceptions of stakeholders in regards to ICT across geographically and philosophically diverse educational experiences.

Since the data collection phase the researcher has engaged in further reading and reflection about engaging children in the research process. It has become clear that when involving children in research good practice would ensure that they are fully informed. The approach used should be thought through on a case-by-case basis and shared with the child at a level that is appropriate to their cognitive and social abilities. While this approach does take some extra thought on the part of the researcher it is respectful of the individual and is in keeping with the United Nations Conventions Rights on the Rights of the Child (United Nations, 1992).

### *Sample size*

The use of a relatively small sample selected from a localised area limited the transferability or usefulness of the findings to the diversity of ECE services evident in New Zealand today. Limitations of time and the approved size of the research project for the Ed.D programme meant that it was not possible to increase the sample size while maintaining the breadth of data gathering. Future research could extend the sample size, conduct a national survey and use a narrower range of research methods.

### *Parents' contribution*

The design of the study did not allow for parent interviews to be conducted. This was due to time constraints and the manageability of the research. However, this proved to be a limitation to the study, which became apparent when parents were contacted

regarding their child's participation in the research, as they were eager to discuss their views of ICT and young children. Given the central importance of a parent in a child's life and the current partnership approach advocated in ECE in New Zealand, this was a limitation of this study. Ensuring that parents are included as central participants in any further studies focusing on ICT and young children would ensure that limitation is rectified.

#### *Observation in the home*

The small-scale design of the study also did not allow time or scope for observations of children to be conducted in their home setting. This approach may be helpful for the researcher to gain a deeper understanding of the ICT experiences that children engage in while in the home setting, rather than solely relying on parents' self reports about children's activities. It would also enable a triangulation of data to occur between ICT use by children and the perceptions of parents and teachers.

#### *Teacher observation*

The research design did not encompass observations of teachers' practice. This was due to time constraints and the manageability of the research. Also, there was an ethical issue as not all teachers agreed to participate in the study, which would have made observations problematic. The addition of observational data would have enabled the researcher to observe practice over time and have enabled data to be further triangulated, thus increasing its validity. Attention to the frequency, type of interaction and pedagogy employed when teachers engage in the use of ICT is worthy of further research.

#### *Interviews with children*

In relation to the sample size, the number of children participating in this study was restricted. Limitations of time meant that it was not possible to increase the sample while maintaining the breadth of data gathering. The findings from this study may have been strengthened if a greater number of children had participated.

The interview strategy relied on children's ability to recall their experiences of using ICT in the ECE setting and their home environment. Photographs were also used as a

reflective tool to extend on these conversations. While this approach worked well with the four year olds, the younger children in the study did not engage so readily. It could be that direct observation of children's use of ICT over time may assist in establishing a relationship with the researcher. Therefore, this information can be drawn on to inform subsequent interviews and provide a rich platform to engage the participating children in discussion.

### *Suggestions for future research*

When considering the limitations of this study alongside the findings, there are a number of areas for further research, including:

- how a teacher's ICT pedagogical approach evolves as they develop more technical know how;
- effectiveness of different professional development models which incorporate both technological and pedagogical knowledge;
- teachers' reluctance to educationalise ECE and engage with key concepts such as multiliteracies;
- the most appropriate balance of functional and critical ICT skills leading to digital literacy about ICT;
- teachers' reluctance to encourage children to think critically both about and through ICT;
- why teachers do not think critically;
- enablers of change in establishing an integrated ICT curriculum in ECE;
- the nature of the partnership with parents and ICT within the curriculum;
- the influence of policy on practice; and
- how policy can be formed to become living.

Finally, many influential studies about the impact of ICT have originated in the United States or the United Kingdom (Yelland, et al., 2000). The New Zealand ECE context should not be assumed to be the same as that of overseas (i.e., age of enrolment, curricula, non-compulsory) and a diversity of services have been established over time (i.e., parent run, home based, for profit, not for profit) (May, 2002). Therefore, we need further New Zealand-based research on the use of ICT, which will inform educational practice, build teacher capability and lead to a more technologically literate society.

### *Final words*

The research literature has shown exponential growth in the use of ICT by teachers in early childhood education. Teachers involved in this study are developing their confidence and competence to use ICT on a daily basis and a small number of centres are empowering children with access to these technologies, although on the evidence of this study such development is still in its infancy.

The use of ICT by young children continues to be shrouded by controversy in the New Zealand and international ECE context. A limited understanding of the benefits clouds teachers' judgement and inhibits the successful integration of ICT into the curriculum. It also indirectly shapes and potentially inhibits the parent partnership model advocated in ECE. Moreover, it exacerbates the moral panic surrounding children's use of ICT. A failure to address these issues may result in a "third wave" of ICT in which history repeats itself.

Notwithstanding these concerns, there is much to celebrate in these results. The study has shown that teachers are open to new ideas and can reflect on their practice when probed and given the opportunity. They are committed to providing quality learning experiences for children, while acting as "gatekeepers" of these new technologies. The teachers involved in this study advocated the importance of children developing a wide range of interests and abilities and inadvertently continued to push against the idea of educationalising ECE. In an ironic way their lack of knowledge and gatekeeping role supports Clements (1987) argument that:

...our goal as educators is to develop problem solvers, not programmers; communicators, not word processors; fulfilled children not early achievers. (p. 42)

Finally, this thesis has argued that balancing the competing perspectives has been and remains difficult, as the pathway to successful integration are multifaceted (Laffey, 2003). There is no single one size fits all solution to the role of ICT in ECE.

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## **Appendix 1: Initial letter of introduction to centres**

2 Annan Grove  
Papakowhai  
Porirua

16<sup>th</sup> July 2007

Kia ora koe. My name is Lisa Oldridge. I am studying for the Doctor of Education degree (Ed.D) at the Massey University College of Education. My doctoral thesis is concerned with parents', teachers' and children's perceptions and practices surrounding the use of information and communication technologies (ICT) in early childhood education (ECE) settings. This letter is to invite you to participate in my doctoral research entitled: **Digital Foundations: A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres.**

### **Participation would involve:**

There are three phases to the research. In the first instance, your participation would involve the completion of a centre questionnaire. In the second phase, two centers in the (suburb) area will be selected on the basis that they have indicated a willingness to continue to participate in the study and are integrating at least two pieces of ICT into the educational programme. They will be sent a second questionnaire for individual teachers and parents to complete on their practice and perceptions of using ICT in ECE centres. The third phase involves teachers and children from these centres participating in individual interviews. No one from outside of the early childhood centre, other than my supervisors and I will view the data gathered.

My supervisors are Associate Professor Mark Brown and Associate Professor Claire McLachlan at the College of Education, Massey University, Private Bag 11 222, Palmerston North. You are welcome to contact them at this address anytime if you have any concerns about the study or by phone on (06) 356-9099.

Please find attached an Information Sheet that outlines the first phase of the research in more detail. The information that you provide as part of this research will be treated confidentially and will only be accessible to those immediately involved in the research. However, it is important to point out that while no teacher or center will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee.

I appreciate this is a generous commitment on the part of your early childhood centre. If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and discuss its focus with you and your involvement before making a decision.

Naku noa na

*Lisa Oldridge*  
M.Ed., B.Ed., Dip Tchg (ECE).

**Appendix 2: Phase One information sheet for head teachers, supervisors or nominee**

**Phase 1 - Digital Foundations:**

**A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

**Information sheet for the head teacher, supervisor or nominee**

This sheet is to introduce myself and to tell you a little about the research I am doing.

**Who am I?**

My name is Lisa Oldridge. I am studying for a Doctor of Education (Ed.D) at the College of Education Massey University. I have worked as a teacher for the past eleven years, including working in kindergartens, community-based parent programmes, the Correspondence School, the Ministry of Education and more recently in tertiary education. I am currently employed by Victoria University of Wellington. My previous qualifications are in Education and I am a parent of two teenage children.

**The research**

The research I am conducting for my Ed.D is to investigate parents', teachers' and children's perceptions and practices surrounding the use of information and communication technologies (ICT) in Early Childhood Education (ECE) centres. This research may potentially be of interest to teachers, parents and policy makers.

**Participation would involve:**

There are three phases to the research. In the first instance, your participation would involve the completion of a centre questionnaire. I plan to gather data through a questionnaire (attached), which has been sent to all early childhood education centres in the (suburb) area. This questionnaire is for the head teacher / supervisor or nominee (a person who has the knowledge to complete the questionnaire accurately) to complete and return in the reply paid envelope provided by (**31<sup>st</sup> July 2007**). It is assumed that completion and return of this questionnaire implies informed consent. However, you are under no obligation to complete the questionnaire or participate in the Phase Two or Three of the research.

If you do agree to participate in Phase 1 of the research then at the end of the questionnaire your centre will be invited to indicate its willingness to participate further in the study. If your centre chooses not to have any further involvement in the study, it would be appreciated if you could still complete the questionnaire provided and return it to me in the reply paid envelope. The information gathered through this process will help me to more accurately record the response rate and inform the ECE sector's ongoing understanding of ICT in ECE. If you indicate a willingness to participate further in the study, I will contact you by (date to be inserted).

In the second phase, two ECE centres will be selected from those that have indicated a willingness to continue to participate in the study and are integrating at least two pieces of ICT into their educational programme. The researcher will contact these and a second questionnaire will be provided for individual teachers and parents to complete on their practice and perceptions of using ICT in ECE. At each phase of the study a separate information sheet will be available, which details the methods and procedures of the data collection.

The third phase involves teachers and children participating in individual interviews. Teachers and parents (on behalf of their child) will indicate a willingness to participate in an interview through completing the written consent form attached with this questionnaire. Children will then be selected by teachers using specific criteria (gender and technology experience) and will be contacted by the researcher.

The researcher would spend a minimal amount of time in the centre to take photographs of children (whose parents have provided written consent) involved in using information and communication technologies. These photographs will be used as a discussion point during the child's interview. Photographs will also be taken of information and communication technology hardware and will also be used as a point of discussion. The photographs will not be used in reporting the results of the study without additional permission.

Teacher interviews will be tape recorded and last for approximately one hour. Children's interviews will last for approximately thirty minutes, although children will be free to finish the interview at anytime. Children's interviews would be conducted in the early childhood center during session time and the researcher will adhere to all center policies regarding the supervision of children. Through the questionnaires and feedback in the interviews, I hope to gather data about parents', children's and teachers' perceptions and practices (direct or indirect) of the information and communication technology with young children.

All data gathering would be undertaken with the consent of participants and on a confidential basis. No one from outside the early childhood centre, other than my supervisors and I, will view the data gathered. Research participants will be invited to read the transcript and / or listen to their own taped conversations. All data will be stored securely in locked cabinets and retained for five years.

Participation in the study is voluntary and you would be able to withdraw at any time. In the event of your withdrawal, taped material and your questionnaire will be destroyed. Neither you nor the centre will be identified in the final report or in any publications or conference papers based on the research, any direct quotes used in publications or presentations will not reveal your identity. However, it is important to point out that while no teacher, parent, child or center will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee. Individuals would be able to withdraw from the study at any time up until the end of the data collection phase.

I appreciate this is a generous commitment on the part of your early childhood centre. If consent is provided teacher interviews would be conducted out of centre hours or during a time that is convenient to those concerned. An executive copy of the research findings will be sent to the two selected early childhood education services at the completion of the study.

I welcome your questions or comments at any time about this research. You can also contact my supervisors at the College of Education, Massey University, Private Bag 11 222, Palmerston North or by phone on (06) 356-9099. They are Associate Professor Mark Brown and Associate Professor Claire McLachlan.

If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and discuss its focus with you and your involvement before making a decision.

Naku noa na

*Lisa Oldridge*

M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

## Appendix 3: Phase One questionnaire for head teacher, supervisor or nominee

### Phase 1: Digital Foundations:

#### A Study of the Perceptions and Practices Surrounding the use of ICT in ECE Centres

### Initial Questionnaire for the Head Teacher / Supervisor

#### Introduction

Thank you for taking the time to read the attached Information Sheet and for agreeing to participate in this questionnaire. Your experiences and knowledge will be used to build a developing understanding of how information communication and technologies (ICT) are currently being used in the early childhood sector.

This questionnaire is for the **head teacher / supervisor or your nominee (a person who has the knowledge to complete this questionnaire accurately)** and will only take about 10 minutes to complete. Please complete each question using the instructions provided.

The following are terms used in this questionnaire:

**Information and communication technology (ICT):** refers to “items of equipment (hardware) and computer programmes (software) that allow us to access, retrieve, store, organise, manipulate, share and present information electronically” (Ministry of Education, 2005, p.4). In early childhood services this may include (but is not limited to) computers, computer software, digital cameras, video cameras, faxes, speaker phones, the internet, PDAs, overhead projectors, data shows, etc.

#### 1. Background Description

1.1 Which of the following best **describes** your ECE service? (please tick one box)

- Education and care centre
- Kindergarten
- Pacific Island EC group
- Playcentre
- Te Kohanga Reo / Māori EC group
- Other (please specify) \_\_\_\_\_

1.2 How many children do you have on your roll? \_\_\_\_\_

1.3 What is the age group of the children in your centre?

- Under two
- Over two
- Mixed age grouping

1.4 How many teachers does your centre employ? \_\_\_\_\_

1.5 How many teachers are employed full-time or part-time? (please insert numbers in the box)

Full-time teachers

Part-time teachers

## 2. Level of Access and Equipment

2.1 What kinds of ICT does your ECE service have? (tick all that apply)

- |  |                                       |
|--|---------------------------------------|
| <input type="checkbox"/> Computer              | <input type="checkbox"/> Scanner      |
| <input type="checkbox"/> Digital still camera  | <input type="checkbox"/> Telephone    |
| <input type="checkbox"/> DVD / video player    | <input type="checkbox"/> Television   |
| <input type="checkbox"/> Email                 | <input type="checkbox"/> Video camera |
| <input type="checkbox"/> Fax machine           | <input type="checkbox"/> Photocopier  |
| <input type="checkbox"/> Internet              |                                       |
| <input type="checkbox"/> Other (please state): |                                       |
- 

2.2 If your service has access to a computer who in the service has access to it? (tick all those who apply)

- |                                   |                                     |  |
|-----------------------------------|-------------------------------------|--|
| <input type="checkbox"/> Managers | <input type="checkbox"/> Teachers   | <input type="checkbox"/> Children            |
| <input type="checkbox"/> Parents  | <input type="checkbox"/> Committees | <input type="checkbox"/> The wider community |

2.3 Where is the computer(s) located in the centre? (Tick all that apply)

- |  |   |
|--|---|
| <input type="checkbox"/> Administration area | <input type="checkbox"/> Children's area                    |
| <input type="checkbox"/> Teacher only area   | <input type="checkbox"/> Another location (say where) _____ |

2.4 How many computers are located in each of these areas? (please insert numbers in the box)

- |  |   |
|--|---|
| <input type="checkbox"/> Administration area | <input type="checkbox"/> Children's area  |
| <input type="checkbox"/> Teacher only area   | <input type="checkbox"/> Another location |

2.5 If children use ICT in your centre, what percentage used ICT last week? (please tick one box)

- Less than 10%
- Less than 25%
- Less than 50%
- More than 75%
- More than 90%

2.6 Does your centre have access to the internet?

- Yes
- No

2.7 If yes, do you have access to broadband or wireless access? (please tick one box)

- Broadband
- Wireless

2.8 Who in your centre has access to the internet? (tick those who apply)

- Head Teacher / Supervisor
- Children
- Teachers'
- Wider community
- Administrator

2.9 On average, how up-to-date are your computers? (please tick all those that apply)

- 1 to 2 years
- 3 to 5 years
- 6 to 10 years
- Older

2.10 Where did the computers come from? (tick those that apply)

- Donated to the centre
- Purchased from fundraising
- Purchased from the operating budget
- Other (please state) \_\_\_\_\_

### 3. Your Use of ICT

3.1 How is ICT used in your centre? (Tick those that apply & indicate how often ICT is used for this purpose.)

3.2 Administration

Not used     Daily     Every few days     Weekly     Monthly

3.3 Searching the internet for resources to support the curriculum or professional learning

Not used     Daily     Every few days     Weekly     Monthly

3.4 Communication with professional organisations and colleagues

Not used     Daily     Every few days     Weekly     Monthly

3.5 To record information about children's learning

Not used     Daily     Every few days     Weekly     Monthly

3.6

Other (please specify) \_\_\_\_\_

### 4. Children's Use of ICT

4.1 What do children at your ECE centre use ICT for? (please tick those that apply)

- Taking photographs with a digital camera
- Making videos
- Playing games on the computer
- Searching the internet
- Watching DVD / videos
- Creating their own presentations
- Sending and receiving email
- Talking on the telephone
- Other (please specify) \_\_\_\_\_

4.2 How often would they engage in these types of experiences? (please tick those that apply)

Taking photographs with a digital camera

Daily                       Weekly                       Monthly                       Never

Making videos

Daily                       Weekly                       Monthly                       Never

Playing games on the computer

Daily                       Weekly                       Monthly                       Never

Searching on the internet

Daily                       Weekly                       Monthly                       Never

Watching DVD / videos

Daily                       Weekly                       Monthly                       Never

Creating their own presentations

Daily                       Weekly                       Monthly                       Never

Sending and receiving email

Daily                       Weekly                       Monthly                       Never

Talking on the telephone

Daily                       Weekly                       Monthly                       Never

4.3 Of the above activities, what has been the most successful way that you have used ICT in your ECE centre? (Please explain)

---

---

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## 5. Professional Development in ICT

5.1 Where did you first learn about using ICT in your centre? (please tick all those that apply)

- Professional development courses
- Collegial support
- Teachers are responsible for their own learning
- Do not do anything
- Other (please state)\_\_\_\_\_

5.2 Where do your teachers continue to learn about ICT? (tick those that apply)

- Professional development courses
- Collegial support
- Teachers are responsible for their own learning
- Do not do anything
- Other (please specify)\_\_\_\_\_

5.3 Overall how would you rate the level of ICT use in your centre? (please tick one box)

- Not a high priority and little use
- Teachers are willing but struggling to adopt
- Steady progress and increasing use
- Routine use on a daily basis

## 6. The Next Phase of the Study

Is your ECE service prepared to participate further in this study?

- Yes
- No

If 'yes', please provide a contact name

Name: \_\_\_\_\_

Role / Title: \_\_\_\_\_

Organisation: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_ Email: \_\_\_\_\_

**Thank you for completing this survey. The attention that you have given it is appreciated. Can you please return your survey by (31<sup>st</sup> July 2007) in the reply paid envelope provided to:**

**Lisa Oldridge  
2 Annan Grove  
Papakowhai  
Porirua  
Wellington**

#### **Appendix 4: Letter seeking consent to conduct research – Centre owner**

2 Annan Grove  
Papakowhai  
Porirua

3<sup>rd</sup> August 2007

Name of education and care centre  
Address

To Whom It May Concern:

**Research investigation: Digital Foundations: A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

Kia ora koe. My name is Lisa Oldridge. I am studying for the Doctor of Education (Ed.D) at the College of Education, Massey University. My doctoral thesis is concerned with parents', teachers' and children's perceptions and practices surrounding the use of information and communication technologies in early childhood settings. **(Supervisors name)** from **(Education and Care center name)** has indicated in phase one of the research a willingness for this centre to participate further in my doctoral research entitled: Digital Foundations: A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres. This letter is to seek your written consent (as the owner) to undertake further research with this centre.

#### **Participation would involve:**

There are three phases to the research. In the first instance, participation would involve the completion of a centre questionnaire. In the second phase, two centers in the (suburb) area will be selected on the basis that they have indicated a willingness to continue to participate in the study and are integrating at least two pieces of ICT into their educational programme. A second questionnaire will then be provided for individual teachers and parents to complete on their practice and perceptions of using information and communication technology (ICT) in early childhood education (ECE) centres. The third phase involves teachers and a small sample of children (with parents' written consent) participating in individual interviews. No one from outside the early childhood centre, other than my supervisors and I will view the data gathered.

In the second phase the researcher would spend a minimal amount of time in the centre to take photographs of children (whose parents have provided written consent) involved in using information communication technologies. These photographs will be used as a discussion point during the child's interview. Photographs will also be taken of information communication technology hardware and will also be used as a point of discussion. The photographs will not be used in reporting the results of the study without additional permission.

Teacher interviews will be tape recorded and last for approximately one hour. Children's interviews will last for approximately thirty minutes, although children will be free to finish the interview at anytime. Children's interviews would be conducted in the early childhood center during session time and the researcher will adhere to all center policies regarding the supervision of children. Teacher interviews would be conducted out of centre hours or during a time that is convenient to those concerned. Research participants will be invited to read the transcript and listen to their own taped conversations.

All data gathering will be undertaken with the consent of participants and on a confidential basis. However, it is important to point out that while no teacher, parent, child or center will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee. Individuals would be able to withdraw from the study at any time.

The final report of the research will be submitted for examination to the College of Education, Massey University in Palmerston North, and deposited in the University Library. The results of the study will be reported at conferences and in journals so that others may learn from the research. My raw data will be stored securely for a period of five years and then destroyed.

My supervisors are Associate Professor Mark Brown and Associate Professor Claire McLachlan at the College of Education, Massey University, Private Bag 11 222, Palmerston North. You are welcome to contact them at this address anytime if you have any concerns about the study or by phone on (06) 356-9099.

I appreciate this is a generous commitment on the part of your early childhood centre. An executive copy of the research findings will be sent to the two participating early childhood education services at the completion of the study.

If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and discuss its focus for your centre and their involvement before making a decision.

If your organisation agrees to provide consent for the nominated early childhood service to participate further in this study please complete the enclosed permission form and return in the reply paid envelope provided.

Naku noa na

*Lisa Oldridge*

M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

## **Appendix 5: Letter seeking consent to conduct research – Kindergarten Association**

2 Annan Grove  
Papakowhai  
Porirua

3<sup>rd</sup> August 2007

Wellington Region Free  
Kindergarten Association  
P.O. Box 51-143  
Tawa

To Whom It May Concern:,

**Research investigation: Digital Foundations: A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

Kia ora koe. My name is Lisa Oldridge. I am studying for the Doctor of Education (Ed.D) at the College of Education, Massey University. My doctoral thesis is concerned with parents', teachers' and children's perceptions and practices surrounding the use of information and communication technologies in early childhood settings. (**name of head teacher**) from (**kindergarten name**) has indicated in phase one of the research a willingness for her kindergarten to participate further in my doctoral research entitled: Digital Foundations: A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres. This letter is to seek your association's written consent to undertake further research with this kindergarten.

### **Participation would involve:**

There are three phases to the research. In the first instance, participation would involve the completion of a centre questionnaire. In the second phase, two centers in the (suburb) area will be selected on the basis that have indicated a willingness to continue to participate in the study and are integrating at least two pieces of ICT into their educational programme. A second questionnaire will then be provided for individual teachers and parents to complete on their practice and perceptions of using information and communication technology (ICT) in early childhood education (ECE) centres. The third phase involves teachers and a small sample of children (with parents' written consent) participating in individual interviews. No one from outside the early childhood centre, other than my supervisors and I will view the data gathered.

In the second phase the researcher would spend a minimal amount of time in the centre to take photographs of children (whose parents have provided written consent) involved in using information communication technologies. These photographs will be used as a discussion point during the child's interview. Photographs will also be taken of information communication technology hardware and will also be used as a point of discussion. The photographs will not be used in reporting the results of the study without additional permission.

Teacher interviews will be tape recorded and last for approximately one hour. Children's interviews will last for approximately thirty minutes, although children will be free to finish the interview at anytime. Children's interviews would be conducted in the early childhood center during session time and the researcher will adhere to all center policies regarding the supervision of children. Teacher interviews would be conducted out of centre hours or during a time that is convenient to those concerned. Research participants will be invited to read the transcript and listen to their own taped conversations.

All data gathering will be undertaken with the consent of participants and on a confidential basis. However, it is important to point out that while no teacher, parent, child or center will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee. Individuals would be able to withdraw from the study at any time.

The final report of the research will be submitted for examination to the College of Education, Massey University in Palmerston North, and deposited in the University Library. The results of the study will be reported at conferences and in journals so that others may learn from the research. My raw data will be stored securely for a period of five years and then destroyed.

My supervisors are Associate Professor Mark Brown and Associate Professor Claire McLachlan at the College of Education, Massey University, Private Bag 11 222, Palmerston North. You are welcome to contact them at this address anytime if you have any concerns about the study or by phone on (06) 356-9099.

I appreciate this is a generous commitment on the part of your early childhood centre. An executive copy of the research findings will be sent to the two participating early childhood education services at the completion of the study.

If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and discuss its focus for your centres and their involvement before making a decision.

If your organisation agrees to provide consent for the nominated early childhood service to participate further in this study please complete the enclosed permission form and return in the reply paid envelope provided.

Naku noa na

*Lisa Oldridge*

M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

**Appendix 6: Consent form for centre owner**

**Digital Foundations:**

**A Study of the Perceptions and Practices Surrounding the use of ICT in  
ECE Centres**

Consent form (center owner)

Permission is sought by Lisa Oldridge a Doctoral student at Massey University College of Education to undertake research with (**Name of the Education and Care Centre a Privately Owned** early childhood service). This research investigates perceptions and practices of parents', children and teachers' in the use of information and communication technologies in early childhood education.

I \_\_\_\_\_

Of \_\_\_\_\_(organisation name)

Agree:

That (**Name of the Education and Care Center**)

Belonging to a **Private Trust**, may be contacted  
and invited to participate in this research.

Date \_\_\_\_\_

Signed \_\_\_\_\_

Position held \_\_\_\_\_

**Appendix 7: Consent form for umbrella organisation**

**Digital Foundations:**

**A Study of the Perceptions and Practices Surrounding the use of ICT in  
ECE Centres**

Consent form (Umbrella organisation)

Permission is sought by Lisa Oldridge a Doctoral student at Massey University College of Education to undertake research with (**name of kindergarten** belonging to the **Wellington Region Free Kindergarten Association**). This research investigates perceptions and practices of parents, children and teachers in the use of information and communication technologies in early childhood education.

I \_\_\_\_\_

Of \_\_\_\_\_ (organisation name)

Agree:

That (**Name of kindergarten**)

Belonging to **Wellington Region Free Kindergarten Association**, may be contacted and invited to participate in this research.

Date \_\_\_\_\_

Signed \_\_\_\_\_

Position held \_\_\_\_\_

## **Appendix 8: Phase Two information sheet for teachers**

### **Phase 2 - Digital Foundations:**

#### **A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

##### **Information Sheet for Teachers**

This sheet is to introduce myself and to tell you a little about the research I am doing.

##### **Who am I?**

My name is Lisa Oldridge. I am studying for a Doctor of Education (Ed.D) at the College of Education Massey University. I have worked as a teacher for the past eleven years, including working in kindergartens, community based parent programmes, the Correspondence School, the Ministry of Education and more recently in tertiary education. I am currently employed by Victoria University of Wellington. My previous qualifications are in Education and I am a parent of two teenage children.

##### **The research**

The research I am conducting for my Ed.D is to investigate parents', teachers' and children's perceptions and practices surrounding the use of the use of information and communication technologies (ICT) in early childhood education (ECE) centres. This research may potentially be of interest to teachers, parents and policy makers.

##### **Phase two of the research**

There are three phases to the research. In the first phase, the head teacher, supervisor or nominated person completed an initial questionnaire and indicated a willingness to continue to participate in the study. This is now the second phase of the research and I have sent a second questionnaire for individual teachers to complete on their practice and perceptions of using ICT in ECE centres. It is assumed that completion and return of this questionnaire implies informed consent. However, you are under no obligation to complete the questionnaire or participate in Phase Two or Three of the research.

All data gathering will be undertaken with the consent of participants and on a confidential basis. No one from outside of the early childhood centre, other than my supervisors and I will view the data gathered. Research participants will be invited to read the transcript and listen to their own taped conversations. All data will be stored securely in locked cabinets and retained for five years.

Participation in the study is voluntary and you would be able to withdraw at any time. In the event of your withdrawal, taped material will be destroyed. Neither you nor the centre will be identified in the final report or in any publications or conference papers based on the research. Any direct quotes used in publications or presentations will not reveal your identity. However, it is important to point out that while no teacher,

parent, child or center will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee.

On completion of this questionnaire, I would be grateful if you would consider participating in Phase 3 of the study. The third phase of the research involves teachers and a small sample of children participating in individual interviews. Teachers who are willing to participate in Phase 3 of the research are asked to complete the separate consent form included with this questionnaire and return both to the sealed box provided in your centre by **(Wednesday 5<sup>th</sup> September, 2007)**. Teacher interviews will be tape recorded and are expected to last for approximately one hour. During these interviews participants can request that the tape recorder be turned off at any time. They will be conducted out of centre hours or during a time that is convenient to those concerned. Research participants will be invited to read the transcript and listen to their own taped conversations. Through the questionnaires and feedback in the interviews, I hope to gather data about parents', children's and teachers' perceptions and practices about the use of ICT with young children.

It would be appreciated if you could complete the questionnaire and return it to the sealed box provided in your centre. The information gathered through this process will help me to more accurately record the response rate and inform the ECE sector's ongoing understanding of ICT in ECE. If you complete and return the consent form to participate further in the study, I will contact you by **(Friday 14<sup>th</sup> September, 2007)**.

I appreciate this is a generous commitment on the part of your early childhood center community. I will also be prepared to present an executive summary of my findings to all involved when the study is completed. An executive copy of the findings will also be sent to the two selected early childhood education services at the completion of the study.

I welcome your questions or comments at any time about this research. You can also contact my supervisors at the College of Education, Massey University, Private Bag 11 222, Palmerston North or by phone on (06) 356-909. They are Associate Professor Mark Brown and Associate Professor Claire McLachlan.

If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and discuss its focus with you and your involvement before making a decision.

Naku noa na

*Lisa Oldridge*

M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

## Appendix 9: Phase Two teacher questionnaire

### Phase 2 - Digital Foundations:

#### A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres

### Teacher Questionnaire

Thank you for agreeing to participate further with this study. The questionnaire will take about 15 minutes to complete. Please complete each question using the instructions provided and to the best of your knowledge.

As explained in the attached Information Sheet, the data that you provide in this questionnaire will be summarised in a final report and individual early childhood services will not be identifiable.

The following definition of information and communication technology is used in this questionnaire:

- Information communication technology: refers to “items of equipment (hardware) and computer programmes (software) that allows us to access, retrieve, store, organise, manipulate, share and present information electronically” (Ministry of Education, 2005, p.4). In early childhood services this may include (but is not limited to) computers, computer software, digital camera’s, video camera’s, faxes, speaker phones, the internet, PDAs, overhead projectors, DVD’s, data shows etc.

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### 1. Background Information

1.1 Please identify the qualifications you currently hold and those you are studying toward by ticking the box

Highest ECE Qualification	Hold	Studying Toward
Diploma of Teaching Early Childhood Education		
Advanced Teaching Diploma		
Bachelors Degree (please identify type of degree held)		
Postgraduate qualification		

Other please specify: \_\_\_\_\_

1.2. This question seeks information on your teaching experience. Please answer each row in the following table.

<b>How many years have you .....</b>	<b>Years</b>
Worked in the ECE field?	
Held your current position?	
Held a supervisor or head teacher position?	

## 2. Your ICT Experience

2.1 Do you have access to a personal computer at home? (please tick one box)

- Yes  
 No

2.2 Do you have personal Internet access at home? (please tick one of the boxes)

- Yes  
 No

2.3 What type of internet access do you have available in your home? (please tick one box)

- Dial up access       Broadband       Wireless       No internet access

2.4 How familiar are you with the Ministry of Education policy developments in this area? (please tick the best response)

- Not well informed**                       **Informed**                       **Very informed**

2.5 How would you rate your technical skills in relation to using ICT? (tick one of the boxes)

When teaching adults / sharing knowledge with colleagues

- None       Novice       Emerging       Proficient       Accomplished

When working with children / supporting and extending learning

- None       Novice       Emerging       Proficient       Accomplished

2.6 How would you rate your teaching skills in relation to using ICT?

None       Novice       Emerging       Proficient       Accomplished

2.7 Which of the following types of ICT have been used (or are definitely planned for use) **by the children** attending your centre this year? (circle the most appropriate answer for each intended use)

Computer	Never	Some Weeks	Most Weeks	Every Week
Scanner	Never	Some Weeks	Most Weeks	Every Week
Digital still camera	Never	Some Weeks	Most Weeks	Every Week
Telephone	Never	Some Weeks	Most Weeks	Every Week
DVD / video player	Never	Some Weeks	Most Weeks	Every Week
Television	Never	Some Weeks	Most Weeks	Every Week
Video camera	Never	Some Weeks	Most Weeks	Every Week
Fax machine	Never	Some Weeks	Most Weeks	Every Week
Email	Never	Some Weeks	Most Weeks	Every Week
Photocopier	Never	Some Weeks	Most Weeks	Every Week
Internet	Never	Some Weeks	Most Weeks	Every Week

Other: (please state) \_\_\_\_\_

2.8 Please explain briefly how you use or plan to use the **most frequently used piece(s)** of ICT that you have identified in the question above (e.g., photographs to support learning stories).

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2.9 Rank in order from the list below the **six** following reasons for ICT use in early childhood services and the educational significances. That is, place **1** beside the most important reason, **2** beside the next most important reason and so forth.

<b>Reasons for ICT use in ECE</b>	<b>Rank order</b>
To develop children's basic skills and computer literacy.	
To develop children's thinking and problem solving skills.	
To develop skills useful for further jobs.	
To develop social skills for collaboration and working with others.	
To encourage children to reflect on their own learning.	
To encourage children to become critical technology consumers.	

### 3. Professional Development

3.1 Have you attended a professional development course on ICT in education over the past two years? (please tick the appropriate box)

- Yes  
 No

3.2 If **yes**, describe the nature of each course?

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3.3 Compared to two years ago are you using the following pieces of ICT more or less frequently? (tick the appropriate boxes)

	<b>Much less</b>	<b>Less</b>	<b>Same</b>	<b>More</b>	<b>Much More</b>
Computer					
Digital camera					
Video camera					
Internet					
Computer software					
Television					
DVD / video player					
Fax					
Email					
Scanner					

3.4 Which of the following best describes your level of ICT use for learning and teaching? (tick the most appropriate stage)

- Learning to use the ICT
- Using the ICT to support my teaching
- Using the ICT to extend the curriculum
- Integrating the unique capabilities of the ICT
- Discovering new and creative uses of ICT in my teaching

3.5 How would you rate your level of confidence of using ICT in your ECE centre? (Please tick the most appropriate answer)?

- Poor       Adequate       Good       Very good       Excellent

3.6 How informed / knowledgeable do you feel about the potential dangers of using ICT with young children? (Please tick the most appropriate)

- Not well informed       Not sure       Informed       Very informed

3.7 How informed / knowledgeable do you feel about the safety issues surrounding the use of ICT? (please tick one box)

- Not well informed       Informed       Very informed

3.8 Do you talk with children about safety issues and ICT use? (please tick one box)

- Not discussed       Occasionally discussed       Regularly discussed

3.9 What do you think are the main constraints on your ICT in ECE?

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3.10 Rank from the list below, the **three** main barriers that inhibit ICT being successfully used for learning and teaching. That is, place **1** beside the main barrier, 2 beside the next barrier and so forth.

<b>Barriers that inhibit ICT being successfully used</b>	<b>Rank order</b>
Cost of the equipment	
Lack of teacher time	
Obsolete technology	
Lack of teacher interest	
Availability of equipment	
Teacher knowledge of the equipment	
Teacher understanding about the value of use	
Cost and availability of technical support	
Management / Committee understanding about value of use	
Teacher knowledge and philosophy about good teaching	
Other	

3.11 Rank in order from the list below where you think ICT is most important in the education sector. That is, place **1** beside the most important area of education, 2 beside the next most important.

<b>Where ICT is most important in the education sector</b>	<b>Rank order</b>
Early childhood education	
Primary education	
Secondary education	
Tertiary education	

(please explain why) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3.12 Do you have any other comments about the use of ICT in early childhood settings that have not been covered?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Personal Details

Please indicate which age category you fit into with a tick in the appropriate box.

- Under 20       20-29       30-39       40-49  
 50+

Sex:     Female     Male

### **Phase three of the research**

If you are prepared to participate in a follow up interview about this topic, please complete the attached permission form.

**Thank you for completing this survey. The attention that you have given it is appreciated. Please return the completed survey by (date to be inserted) in the sealed drop box located at your early childhood centre.**

## **Appendix 10: Phase Two information sheet for parents**

### **Phase 2 - Digital Foundations:**

#### **A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

##### **Information Sheet for Parents**

This sheet is to introduce myself and to tell you a little about the research I am conducting on information and communication technologies (ICT) in Early Childhood Centres (ECE).

##### **Who am I?**

My name is Lisa Oldridge. I am studying for a Doctor of Education (Ed.D) at Massey University College of Education. I have worked as a teacher for the past eleven years, including working in kindergartens, community based parent programmes, the Correspondence School, the Ministry of Education and more recently in tertiary education. I am currently employed by Victoria University of Wellington. My previous qualifications are in Education and I am a parent of two teenage children.

##### **The research**

The research I am conducting for my Ed.D is to investigate parents', teachers' and children's perceptions and practices surrounding the use of the use of information and communication technologies (ICT) in early childhood education (ECE) centres. The term ICT refers to "items of equipment (hardware) and computer programmes (software) that allows us to access, retrieve, store, organise, manipulate, share and present information electronically" (Ministry of Education, 2005, p.4). This research may potentially be of interest to teachers, parents and policy makers.

##### **Phase two of the research**

There are three phases to the research. In the first phase, the head teacher, supervisor or nominated person completed an initial questionnaire and indicated a willingness to continue to participate in the study. This is now the second phase of the research which involves a questionnaire of parents/caregivers. The questionnaire seeks data on their practice and perceptions of using ICT with young children. The attached questionnaire is for individual parents/caregivers to complete. It is assumed that completion and return of this questionnaire implies informed consent. However, you are under no obligation to complete the questionnaire or participate in the Phase Two or Three of the research.

The third phase of the research involves teachers and a small sample of children participating in individual interviews. If you are willing for your child to participate in an interview please complete the separate consent form included with this questionnaire and return it to the sealed box provided in your early childhood centre by **(Wednesday 5<sup>th</sup> September, 2007)**. The children for this phase will be selected by the head teacher/supervisor and the researcher using specific criteria based on gender and level of technology experience. Families will be contacted by the researcher.

Before commencing the interviews agreement will be sought from the children to participate in the interview. If they are unwilling to participate they will not be included in the study. Interviews will last for approximately 30 minutes, although children will be free to finish the interview at anytime. During these interviews participants can request that the tape recorder be turned off at any time. These interviews will be conducted in the early childhood centre during session time and the researcher will adhere to all centre policies regarding the supervision of children. Through the questionnaires and feedback in the interviews, I hope to gather data about parents', children's and teachers' perceptions and practices on the use of ICT with young children.

All data gathering will be undertaken with the consent of participants and on a confidential basis. No one from outside of the early childhood centre, other than my supervisors and I will view the data gathered. Research participants will be invited to read the transcript and/or listen to their own taped conversations. All data will be stored securely in locked cabinets and retained for five years.

Participation in the study is voluntary and you will be able to withdraw at any time. In the event of your withdrawal, taped material will be destroyed. Neither you nor the centre will be identified in the final report or in any publications or conference papers based on the research; moreover, any direct quotes used in publications or presentations will not reveal your identity. However, it is important to point out that while no teacher, parent, child or centre will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee.

If you choose to complete the questionnaire you are under no obligation for your child to participate in Phase 3 of the study. Thus, it would be appreciated if you could still complete the questionnaire and return it to the sealed box provided in your centre. The information gathered through this process will help me to more accurately record the response rate and inform the ECE sector's ongoing understanding of ICT use in education. If you choose to participate in the study please complete both the questionnaire and consent form and return it to the sealed box provided in your early childhood center by **(Wednesday 5<sup>th</sup> September, 2007)**. If your son or daughter is selected to participate further in the study I will make contact with you by **(Friday 14<sup>th</sup> September, 2007)**.

I appreciate this is a generous commitment on your part and the part of your early childhood centre community. Accordingly, I will be prepared to present a brief summary of my findings, when the study is completed to all involved. An executive copy of the findings will also be sent to the two selected early childhood education services at the completion of the study.

I welcome your questions or comments at any time about this research. You can also contact my supervisors at the College of Education, Massey University, Private Bag 11 222, Palmerston North. They are Associate Professor Mark Brown and Associate Professor Claire McLachlan and can be contacted by phone on (06) 356-9099.

If you require any further information regarding participation in the project, please contact me on (04) 233-2323. If you wish to know more about the project, I am happy to meet with you and to discuss the research and your potential involvement before making a decision.

Yours sincerely

*Lisa Oldridge*

M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

## Appendix 11: Phase Two parent questionnaire

### Phase 2 - Digital Foundations:

A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres

### Parent Questionnaire

Thank you for agreeing to participate in this study. The questionnaire will take about 15 minutes to complete. Please complete each question using the instructions provided and to the best of your knowledge.

The information that you provide will be extremely useful and will enhance the value of the research. The findings will be summarised in a final report in which individual early childhood services, parents', children and teachers' will not be identifiable.

The following definition of information and communication technology is used in this questionnaire:

- Information communication technology refers to “items of equipment (hardware) and computer programmes (software) that allow us to access, retrieve, store, organise, manipulate, share and present information electronically” (Ministry of Education, 2005, p.4). In early childhood services this may include (but is not limited to) computers, computer software, digital camera's, video camera's, faxes, speaker phones, the internet, PDAs, overhead projectors, DVD's, data shows etc.

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#### 1. Level of Access

1.1 What ICT is available in your home? (where appropriate please tick the box)

- |  |                                       |
|--|---------------------------------------|
| <input type="checkbox"/> Computer                    | <input type="checkbox"/> Scanner      |
| <input type="checkbox"/> Digital still camera        | <input type="checkbox"/> Telephone    |
| <input type="checkbox"/> DVD / video player          | <input type="checkbox"/> Television   |
| <input type="checkbox"/> Email                       | <input type="checkbox"/> Video camera |
| <input type="checkbox"/> Fax machine                 | <input type="checkbox"/> Photocopier  |
| <input type="checkbox"/> Internet                    |                                       |
| <input type="checkbox"/> Other (please state): _____ |                                       |

1.2 Please identify if your child uses and has access to any of the following ICT. (please tick any your child can access and indicate where they have access)

Uses	Access in		
<input type="checkbox"/> Computer	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Scanner	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Digital still camera	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Telephone	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Television	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> DVD / video player	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Video camera	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Internet	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Playstation / Xbox	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)
<input type="checkbox"/> Cellphone and other mobile devices	<input type="checkbox"/> Living area	<input type="checkbox"/> Bedroom	<input type="checkbox"/> Other (please indicate where)

1.3 What type of internet access do you have available in your home? (please tick one box)

- Dial up access       Broadband       Wireless       No internet access

1.4 How often does your child use the computer at home? (please tick one box)

- Hardly ever     Daily     Weekly     Fortnightly     Monthly     None (as does not use)

1.5 Last week how much time did your child spend on the computer? (please tick one box)

- Less than 1 hour     1-5 hours     5-10 hours       Over 10 hours

1.6 Last week how much time did your child spend on the internet? (please tick one box)

- Less than 1 hour     1 – 5 hours       5 – 10 hours       Over 10 hours

## 2. Computer Use

2.1 If your child is using the computer, in what activities do they normally participate? (please tick all those that apply)

- |   |   |
|---|---|
| <input type="checkbox"/> Playing CD-ROM games         | <input type="checkbox"/> Creating their own presentations |
| <input type="checkbox"/> Watching DVDs                | <input type="checkbox"/> Downloading photos from a camera |
| <input type="checkbox"/> Downloading music            | <input type="checkbox"/> Drawing / Art activities         |
| <input type="checkbox"/> Email                        | <input type="checkbox"/> Educational programmes           |
| <input type="checkbox"/> Other (please specify) _____ |   |

2.2 Could you give an example of one of their favourite activities on the computer?

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2.3 When your child is using the computer, how concerned are you about what they might be doing?

- Not concerned                       Somewhat concerned                       Very concerned

2.4 How do you supervise and regulate their use of the computer?

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## 3. Perceptions of Computer Use

3.1 What is your view of the use of computers in the home environment with young children? (please tick one box for each question)

I think the ability to use new technology is essential to young children's education

- Agree                       Partly agree                       Not sure                       Disagree

Children learn so much through having access to a computer in the home

- Agree                       Partly agree                       Not sure                       Disagree

Children do not require access to these technologies

- Agree                       Partly agree                       Not sure                       Disagree

3.2 What is your view of the use of ICT with young children in early childhood centres? (please tick one box)

Every early childhood education centre should have access to these resources

- Agree                       Partly agree                       Not sure                       Disagree

Computers are an essential part of the early childhood education experience

- Agree                       Partly agree                       Not sure                       Disagree

The money spent on computer technology could be better used on other equipment

- Agree                       Partly agree                       Not sure                       Disagree

Children do not need access to computer technology under five years of age

- Agree                       Partly agree                       Not sure                       Disagree

3.3 How informed / knowledgeable do you feel about the potential dangers of using ICT with young children?

- Not well informed                       Not sure                       Informed                       Very informed



3.4 This picture from a recent Telecom television advertisement shows Fast Eddie using technology. How concerned are you about your child using all of this technology in the future? (please tick one box)

- Not concerned at all                       Not sure                       A little concerned                       Somewhat concerned                       Very concerned

3.5 Please elaborate on your answer to the previous question in the space below.

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3.6 Rank in order from the list below the **six** reasons for ICT use in early childhood services and their educational importance. That is, place **1** beside the most important reason, **2** beside the next most important.

<b>Reasons for ICT use in ECE</b>	<b>Rank order</b>
To develop children's basic skills and computer literacy.	
To develop children's thinking and problem solving skills.	
To develop skills useful for further jobs.	
To develop social skills for collaboration and working with others.	
To encourage children to reflect on their own learning.	
To encourage children to become critical technology consumers.	

3.7 Rank in order from the list below where you think ICT is most important in the education sector. That is, place **1** beside the most important area of education, **2** beside the next most important.

<b>Where ICT is most important in the education sector</b>	<b>Rank order</b>
Early childhood education	
Primary education	
Secondary education	
Tertiary education	

(please explain why) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### **4. Personal Details**

4.1 Please indicate which age category you fit into with a tick in the appropriate box.

Under 20       20-29       30-39       40-49       50+

4.2 Please indicate your relationship to the child.

Mother       Father       Guardian

4.3 How many children under the age of 16 live with you?

\_\_\_\_\_

4.4 Do you identify yourself as: (please tick one box)

- Pakeha (European)
- Māori
- Pacific Nation
- Asian
- Other (please state)\_\_\_\_\_

4.5 Please indicate your highest secondary qualification: (please tick one box)

- None
- School Certificate / NCEA level 1
- 6<sup>th</sup> form Certificate / NCEA level 2
- University Entrance / NCEA level 3
- Other

### **Phase three of the research**

If you are prepared for your child to participate in a follow up interview about this topic, please complete the attached consent form.

**Thank you for completing this survey. The attention that you have given it is appreciated. Please return the completed survey by (date to be inserted) in the sealed drop box located at your early childhood centre.**

**Appendix 12: Phase Three consent form for child to participate in research**

**Digital Foundations**

A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres

**Phase 3: AUTHORITY to Interview Children**

**This form will be held for a period of five (5) years**

I confirm that I have read the Information Sheet provided regarding the research project and agree to my child participating in an interview in the early childhood environment.

I agree to allow the audio taping of my child's interview and understand that I will be supplied with a copy of the tape of my child's conversations with the researcher, at my request. Any direct quotes that the researcher intends to use from the taped interview will require my written consent.

I understand that my child's participation is voluntary and that I can withdraw my child's participation from the study at any time up until the end of the data collection phase.

I understand that my child's name, and the name of the centre, will be confidential to the researcher and her supervisors and that any direct quotes used in publications or presentations based on the study will not reveal their identity.

<b>Parent's Full Name (printed):</b>	
<b>Child's Name:</b>	
<b>Relationship to the Child:</b>	
<b>Child's Age:</b>	<b>Sex: Male / Female</b>
<b>Contact Address:</b>	
<b>Contact telephone number:</b>	
<b>Name of your child's early childhood centre:</b>	
<b>Signature:</b>	<b>Date:</b>

## **Appendix 13: Phase Three teachers' information sheet**

### **Phase 3 - Digital Foundations:**

#### **A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

##### **Information sheet for teachers**

Thank you for agreeing to participate further in the research about parents', teachers' and children's perceptions and practices surrounding the use of information communication technologies in early childhood education centres.

##### **Phase three of the research**

The final phase of the research involves interviewing teachers. These interviews will be approximately one hour in length and will be conducted at the early childhood centre or at a location that is suitable to the participant. Interviews will be tape-recorded. However, during these interviews participants can request that the tape recorder be turned off at any time. At the completion of the interview research participants will be invited to listen to their own taped conversations.

All data gathering would be undertaken with the consent of participants and on a confidential basis. No one from outside of the early childhood centre, other than my supervisors and I will view the data gathered. All data will be stored securely in locked cabinets and retained for five years.

In addition to the teacher interviews this phase also involves the researcher taking photographs of children (participating in the research) using information and communication technologies in their early childhood centre. These photographs will then be used with the children who are participating in the research as a point of discussion in the interviews. These photographs will not be used in reporting the findings of this study unless explicit permission has been obtained after the completion of the research.

Participation in the study is voluntary and you will be able to withdraw at any time. In the event of your withdrawal, your taped interview will be destroyed. Neither you nor the centre will be identified in the final report or in any publications or conference papers based on the research, any direct quotes used in publications or presentations will not reveal your identity. However, it is important to point out that while no teacher, parent, child or centre will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee.

I appreciate this is a generous commitment on the part of your early childhood centre community. Accordingly, I will be prepared to present a brief summary of my findings, when the study is completed to all involved. An executive copy of the findings will also be sent to the two selected early childhood education services at the completion of the study.

I welcome your questions or comments at any time about this research. You can also contact my supervisors Associate Professor Mark Brown and Associate Professor Claire McLachlan at the:

College of Education  
Massey University  
Private Bag 11 222  
Palmerston North

Phone on (06) 356-9099.

Yours sincerely

*Lisa Oldridge*  
M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

**Appendix 14: Consent to interview the teacher**

**Digital Foundations**

A Study of Perceptions and Practices surrounding the use of ICT in ECE  
Centres

**Phase 3: AUTHORITY to Interview Teachers**

**This form will be held for a period of five (5) years**

I confirm that I have read the Information Sheet provided regarding the research project and agree to participate in an interview.

I agree to allow myself to be audio taped during the interview and understand that I will be supplied with a copy of the tape of this conversation with the researcher, at my request. Any direct quotes that the researcher intends to use from the taped interview will require my written consent.

I understand that my participation is voluntary and that I can withdraw my participation from the study at any time.

I understand that my name, and the name of the centre, will be confidential to the researcher and her supervisors and that any direct quotes used in publications or presentations based on the study will not reveal their identity.

<b>Full Name (printed):</b>	
<b>Name of the early childhood centre:</b>	
<b>Contact Address:</b>	
<b>Contact telephone number(s):</b>	
<b>Signature:</b>	<b>Date:</b>

**Appendix 15: Consent form to photograph teachers**

**Digital Foundations**

A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres

**AUTHORITY to use Photographs in Disseminating Information about this Study**

**This form will be held for a period of five (5) years**

During the data-gathering phase of the Digital Foundations study photograph/s were taken of you using a range of information and communication technologies in the early childhood environment with children. I am seeking your consent to use these photograph/s in the dissemination of the findings to a wider education audience.

These photographs may appear in visual presentations (e.g., PowerPoint) and / or in written publications (journals).

All data including the photographs will be kept for a period of five years in a secured area.

I give permission for these photographs to be used in this way for up to a period of five years.

<b>Teacher's name:</b>	
<b>Signature:</b>	
<b>Full name – printed</b>	
<b>Early childhood service</b>	<b>Date:</b>

## **Appendix 16: Phase Three parent information sheet**

### **Phase 3 - Digital Foundations:**

A Study of Perceptions and Practices surrounding the use of Information and Communication Technologies in Early Childhood Education Centres

#### **Information sheet for parents**

Thank you for agreeing to participate further in the research about parents', teachers' and children's perceptions and practices surrounding the use of information communication technologies in early childhood education centres.

#### **Phase three of the research**

The final phase of the research will involve the researcher taking photographs of your child using information and communication technologies in their early childhood service. These photographs will then be used with those children participating in the research as a point of discussion in the interviews. The photographs will not be used in reporting of the findings of this study unless explicit permission has been obtained after the completion of the data collection.

Interviews will be conducted at the early childhood centre where the researcher will adhere to all of the centre policies regarding the supervision of children. These interviews will last approximately thirty minutes, although children are, of course, free to leave the interview at anytime. Interviews will be tape-recorded. However, participants can request that the tape recorder be turned off at any time. At the completion of the interview you would be welcome to listen to a copy of your child's conversation.

All data gathering would be undertaken with the consent of participants and on a confidential basis. No one from outside of the early childhood centre, other than my supervisors and I will view the data gathered. All data will be stored securely in locked cabinets and retained for five years.

Participation in the study is voluntary and you would be able to withdraw at any time. In the event of your withdrawal, your child's taped interview will be destroyed. Neither your child nor the centre will be identified in the final report or in any publications or conference papers based on the research, any direct quotes used in publications or presentations will not reveal your child's identity. However, it is important to point out that while no teacher, parent, child or centre will be directly identified in the research findings, it is impossible to guarantee absolute confidentiality. The researcher can only give an assurance of confidentiality based on a personal guarantee. Individuals will be able to withdraw from the study at any time.

I appreciate this is a generous commitment on your part and the part of your early childhood centre community. Accordingly, I will be prepared to present a brief

summary of my findings, when the study is completed, to all involved. An executive copy of the findings will also be sent to the two selected early childhood education services at the completion of the study.

A permission form is attached to this information sheet, which seeks your consent to have your child photographed (by the researcher) in the early childhood centre using information and communication technologies. Please complete this form and return it directly to me in the reply paid envelope by **(19th September 2007)**.

I welcome your questions or comments at any time about this research. You can also contact my supervisors Associate Professor Mark Brown and Associate Professor Claire McLachlan at the:

College of Education  
Massey University  
Private Bag 11 222  
Palmerston North

Phone on (06) 356-9099.

Yours sincerely

*Lisa Oldridge*  
M.Ed., B.Ed., Dip Tchg (ECE).

This project has been reviewed and approved by the Massey University Ethics Committee: Southern B, Application 07/29. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email <mailto:humanethicsouthb@massey.ac.nz>

**Appendix: 17: Consent form to photograph children in the ECE centre**

**Phase 3: Digital Foundations**

**A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres**

**AUTHORITY to Photograph Children**

**This form will be held for a period of five (5) years**

I confirm that I have read the information sheet provided regarding the research project and agree to my child being photographed in the early childhood environment.

I agree the photographs of children engaged in using ICT can be used as prompt for discussion with the children involved in this study at (name of centre).

These photographs will not be used in the reporting of the findings of this study unless explicit permission has been obtained after the completion of the research.

All data including the photographs will be kept for a period of five years in a secured area.

<b>Child's name:</b>	
<b>Signature:</b>	
<b>Full name – printed</b>	
<b>Relationship to the child:</b>	<b>Date:</b>

## **Appendix 18: Phase Three interview guidelines**

### **Phase 3: Digital Foundations**

A Study of Perceptions and Practices surrounding the use of ICT in ECE Centres

#### **Guidelines for Interview**

##### **Starting the Interview**

**1. Briefing – Interviewer to provide general explanation regarding:**

- **purpose of the project (including previous stages)**
- **introduce self**
- **purpose of the interview**
- **how the data will be used**

##### **Purpose and Stages of the project:**

“This research project is based at the Massey University College of Education.”

“The aim of the study is to use a constant comparative methodology to develop an explanation of how parents’, teacher’s and children’s perceptions of the use of information and communication technology in early childhood education influences the educational programme offered.”

“This research project has several stages. In the first stage contact with all licensed early childhood services in the (suburb) area of Wellington was made through an initial survey. This survey investigated the type of information and communication technology that was available in these centres and explored how often and for what purpose it was used. Teachers then indicated their interest in participating further in the study.”

“Through information provided on the initial centre questionnaire the research sample was refined to represent two early childhood services. The second stage of the study was to survey all parents and teachers from the selected early childhood services. At this point parents who agreed to their child participating further in the study provided written consent.”

“The interview with you is part of the third stage of the study. We are now interviewing early childhood teachers (who have expressed an interest) from the two services selected in phase two and a small number of children representing these same services.”

“At the conclusion of this study, I would be happy to present a summary of my impressions of the centres’ use of their information and communication technology and the perceptions of the parents, teachers and children regarding this use.” An executive copy of the findings will also be sent to the two selected early childhood education services at the completion of the study”.

### **Introduction**

“My name is Lisa Oldridge and I am undertaking this research to fulfil the requirements as a doctoral candidate at Massey University College of Education.”

### **Purpose of the Interview**

“The aim of the interview is to explore teachers’, parents’ and children’s beliefs and practices concerning the use of information and communication technology with young children. The interview questions were developed considering previous surveys undertaken in this area of research and to gather insight into your perceptions around this phenomenon.”

### **How the data will be used**

“The information from the interview with you will be used as part of the study. Anything you say will be kept anonymous by using fictitious names. If it is all right with you, I will record the interview. If you feel uncomfortable you can withdraw from the interview at any time. If you choose this option, the information regarding your interview will be destroyed or returned to you.”

- 2. Interviewer to turn the recording device on.**
- 3. Interviewer to ask if there is anything the interviewee would like to ask about the project.**

### **Teachers’ surveys:**

Seek further clarification on question 3.11 made in the teachers’ survey.

- Question 3.11 – elaborate on the ranking applied.

### **Project Questions for teachers:**

#### **Approaches to using information and communication technology in this centre.**

1. Tell me about what you think is the best use made of ICT in your ECE service?
2. Are there other ways that you would like to use ICT in your centre if you had the opportunity?
  - What is it that is stopping you from acting?
  - Is there anything you could do to change this?

### **Pedagogy and curriculum**

3. Tell me about your philosophy of teaching?
  - How does ICT fit with your teaching philosophy?
  - Is your approach to ICT use based on any particular theory?
4. How is the centres use of ICT related to *Te Whāriki*, the early childhood curriculum?
5. How helpful is *Te Whāriki* in guiding the use of ICT?
6. What do you consider the role of the teacher regarding the use of ICT in ECE?
7. Using photographs of the ICT equipment as prompts
  - Can you describe what children do with the ICT that you have available?
  - Why have you placed the ICT equipment in this way?
  - What criteria do you use for selecting ICT resources for the centre?
8. Do teachers need any specific skills or knowledge to be able to help children to develop skill / knowledge in using ICT?
  - a. What are these skills?
  - b. How do you ensure staff have them?
  - c. What sort of support do the owners/managers of this centre provide to help you in this role?
9. How do you evaluate the effectiveness of your approach to using ICT in this centre?

### **Children and Parents**

10. How are parents consulted and informed regarding the use of ICT in the centre?
  - What is the parents' reaction to the use of ICT in the centre?
11. What is the children's reaction to the use of ICT in their centre and why?
12. Do you link the use of ICT with children's home lives and their wider world?
  - Explain how the centre does this?
  - Could something further be done, if so what?
13. Is there anything else you would like to tell me about your centre's approach to ICT?

### **Project Questions for children:**

1. Tell me about what you like to do when you are at the centre?
2. What things do you like to do at home?
3. Ask children to draw a picture of a computer / digital camera and explain its parts to me.

### **Using photographs as prompts**

- Can you tell me about what you were doing in this photo?
- What do you know about how this piece of equipment works?
- If you were given a (computer, digital camera, video etc) what would you do with it?

Is there anything you would do differently next time and why?

Note: When specific answer seems unclear, Interviewer to use probes such as:

- "Could you tell me more about...?"
- "Exactly how many ... were involved?"
- "What do you mean by...?"

### **Ending the Interview:**

4. Interviewer to thank the interviewee for his/her participation.
5. Interviewer to leave a contact address/ number for future contact.
6. Interviewer to ask if there is anything the interviewee would like to add/say.

### **After Interview:**

7. Interviewer to record notes on the setting and impressions of the interviewee's position, disposition and attitude.

## **Appendix 19: Example of memo writing**

### **Example of memo writing**

The way in which teachers' beliefs strongly influence their teaching practice has been a strong theme to emerge. Data gathered in the interview process supports this. Through the interviews teachers' discussed their views of ICT and why they used it in a particular way with children. This thread of discussion actually led onto teachers reflecting on their own practice.

Daisy commented:

So maybe how we view [the computer] it is a little bit negative as well like if you spend too much time on the computer you might not do this or that, but when children choose to paint and paint all day they are allowed to.

During the interviews a number of teachers acknowledged that their view of ICT was quite narrow (e.g., the computer) and they had to keep reminding themselves that it was more than this. A range of negative terms were used when talking about ICT use by children (e.g., addicted, obsessive) and this appeared to influence how the teachers believed ICT should be offered and to whom. The use of ICT was also not held at the same level of esteem as other learning experiences offered in the centre.

For example Bridget stated:

I suppose there's an element of how much ICT do you want to have when there's so much like hands on learning with the real matter and material. And I mean you can debate this forever, how much do children need or not need equipment where they're sat at which, because we all know it is good for growing bodies that need lots of exercise and all that sort of thing and does it start to take the place of social interaction in a real context. I mean I know kids have social interactions at the computer but it's not the same as being out and

about, outside or inside, using their imagination or working together on a project because, I mean really, when they're using a piece of equipment, you are, you are more involved with the equipment than the people that maybe around you at it. So it's not the same its different an artificial group experience.

This was interesting as I began to wonder why teachers would choose to offer ICT in the learning programme when their personal beliefs appeared not to be congruent with their actual practice. As I reflected on this it highlighted for me the “moral panic” that surrounds the use of ICT by children, which is a strong thread in the literature review.

**Appendix 20: Authority to transcribe tape for child**

**Phase 3: Digital Foundations**

A Study of the Perceptions and Practices surrounding the use of ICT in  
ECE Centres

**AUTHORITY FOR THE RELEASE OF TAPE TRANSCRIPTS**

**This form will be held for a period of five (5) years**

I confirm that I have had the opportunity to read and amend the transcript of the interview conducted with my child.

I agree that the edited transcript and extracts from this may be used by the researcher, *[Lisa Oldridge]* in reports and publications arising from the research.

<b>Child's name:</b>	
<b>Signature:</b>	
<b>Full name – printed</b>	
<b>Relationship to the child:</b>	<b>Date:</b>

**Appendix 21: Authority to transcribe the teacher's tape**

**Phase 3: Digital Foundations**

A Study of the Perceptions and Practices surrounding the use of ICT in  
ECE Centres

**AUTHORITY FOR THE RELEASE OF TAPE TRANSCRIPTS**

**This form will be held for a period of five (5) years**

I confirm that I have had the opportunity to read and amend the transcript of my interview.

I agree that the edited transcript and extracts from this may be used by the researcher, *[Lisa Oldridge]* in reports and publications arising from the research.

<b>Full Name (printed):</b>	
<hr/>	
<b>Name of the early childhood centre:</b>	
<hr/>	
<b>Contact Address:</b>	
<hr/>	
<b>Contact telephone number(s):</b>	
<hr/>	
<b>Signature:</b>	<b>Date:</b>
<hr/>	<hr/>